OM-203 185B

November 2001

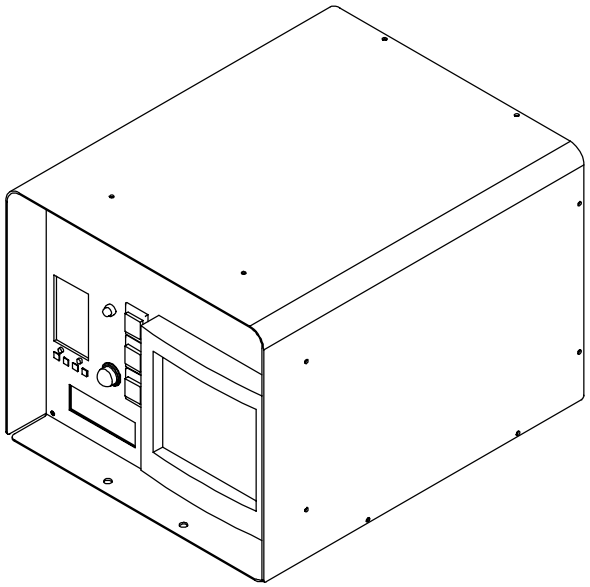
Processes

Induction Heating

Description

Single Induction Heating Power Source
Temperature Control/Recorder

IH/TS



OWNER'S MANUAL

Visit our website at
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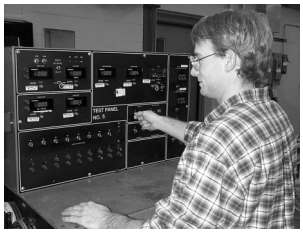
From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.



That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller
The Power of Blue.

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING 1
1-1. Symbol Usage 1
1-2. Induction Heating Hazards 1
1-3. Additional Symbols for Installation, Operation, and Maintenance 2
1-4. Principal Safety Standards 2
1-5. EMF Information 2

SECTION 1 – MESURES DE SECURITE POUR LE CHAUFFAGE PAR INDUCTION 3
1-1. Dangers supplémentaires de mise en route, de fonctionnement et d'entretien 4
1-2. Informations concernant les champs électro-magnétiques (Information EMF) 5
PRINCIPALES NORMES DE SÉCURITÉ 5

SECTION 2 – INTRODUCTION 6

SECTION 3 – INSTALLATION 7
3-1. Specifications 7
3-2. IH/TC Installation 7
3-3. Connecting To Power Source 8
3-4. Input 14 Pin Information For Receptacle RC1 8
3-5. Connecting 25kW System Cords And Cables 9
3-6. Connecting 5kW System Cords And Cables 10
3-7. Connecting External Device 11

SECTION 4 – COMPONENTS AND CONTROLS 12
4-1. IH/TS Front Panel 12
4-2. IH/TS Rear Panel 13
4-3. Controller 14

SECTION 5 – SETUP AND OPERATION 15
5-1. Safety Equipment 15
5-2. IH/TS Setup 15
5-2-1. Select Power Source 15
5-2-1-1. Resetting All RAM Variables 15
5-2-2. Time Date Setup – Digital 16
5-2-2-1. Digital Recorder Controls 16
5-2-2-2. Login As Engineer 16
5-2-2-3. Go To Operator Screen 16
5-2-2-4. Date Setup 16
5-2-2-5. Time Setup 17
5-2-2-6. Login As Operator 17
5-2-2-7. Go To Home Screen 17
5-3. Operation 18
5-3-1. Programming The 2408 Controller 19
5-3-2. Batch Recording Using 5100 Digital Recorder 24
5-3-2-1. Login As Operator 24
5-3-2-2. Start Recording 24
5-3-2-3. Stop Recording 24
5-3-2-4. Saving Data To A Disk 25
5-3-3. Running A Program To Preheat Or Stress Relief 26
5-3-4. Recovering From An Interruption 26
5-3-5. Viewing Data In Review Software 26
5-3-6. Running Review Software 27
5-3-7. Typical Profile Chart Printout 38

(Continued)

TABLE OF CONTENTS

SECTION 6 – CONFIGURING CONTROLLER AND RECORDER 39

6-1. Changing Controller Operating Window, Ramp, Dwell, Or Temperature Units 39

6-2. Restoring Configuration From A Serialized Floppy Disk On The Recorder (For 5100 Digital Recorder) 40

6-2-1. Load File 40

6-2-2. Date Setup 40

6-2-3. Time Setup 40

6-2-4. Screen Setup 41

6-2-5. Login As Operator 41

6-2-6. Go To Home Screen 41

SECTION 7 – MAINTENANCE & TROUBLESHOOTING 42

7-1. Routine Maintenance 42

7-2. Troubleshooting 42

7-3. Factory Set Parameters 43

7-3-1. 2408 Controller Edit Parameters 44

7-3-2. 2408 Controller Full Parameters 45

7-3-3. 2408 Controller Configure Parameters 46

SECTION 8 – ELECTRICAL DIAGRAMS 47

SECTION 9 – PARTS LIST 48

WARRANTY

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

1-1. Symbol Usage

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Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Induction Heating Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The power circuit and output bus bars or connections are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Enclose any connecting bus bars and coolant fittings to prevent unintentional contact.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Use only nonconductive coolant hoses with a minimum length of 18 inches (457 mm) to provide isolation.
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- Do not touch power circuit if you are in contact with the work, ground, or another power circuit from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any internal parts.

INDUCTION HEATING can cause burns.

- Hot parts and equipment can injure.
- Do not touch or handle induction head/coil during operation.
- Do not touch hot parts bare-handed.
- Allow cooling period before handling parts or equipment.
- Keep metal jewelry and other metal personal items away from head/coil during operation.

FIRE OR EXPLOSION hazard.

- Do not overheat parts and adhesive.
- Watch for fire; keep extinguisher nearby.
- Keep flammables away from work area.
- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not operate unit in explosive atmosphere.

FUMES AND GASES can be hazardous.

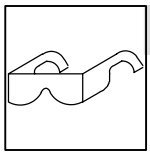
Induction Heating of certain materials, adhesives, and fluxes can produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust to remove fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for adhesives, fluxes, metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Fumes and gases from heating can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not heat in locations near degreasing, cleaning, or spraying operations. The heat can react with vapors to form highly toxic and irritating gases.
- Do not overheat coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the heated area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if overheated. See coating MSDS for temperature information.

1-3. Additional Symbols for Installation, Operation, and Maintenance

FALLING UNIT can cause injury.

- Use handle and have person of adequate physical strength lift unit.
- Move unit with hand cart or similar device.
- For units without a handle, use equipment of adequate capacity to lift unit.
- When using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

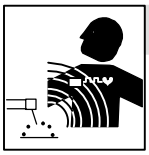


FLYING METAL OR ADHESIVE can injure eyes.

- Wear approved safety glasses with side shields or wear face shield.

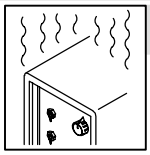
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



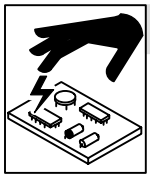
MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near induction heating operations.



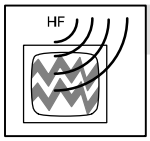
OVERUSE can cause OVERHEATING

- Allow cooling period.
- Reduce output or reduce duty cycle before starting to heat again.
- Follow rated duty cycle.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified person familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut.

1-4. Principal Safety Standards

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Canadian Electrical Code Part 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard,Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

1-5. EMF Information

Considerations About Induction Heating And The Effects Of Low Frequency Electric And Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Arrange output cable to one side and away from the operator.
2. Do not coil or drape output cable around the body.
3. Keep power source and cable as far away from the operator as practical.

About Pacemakers:

The above procedures are also recommended for pacemaker wearers. Consult your doctor for complete information.

SECTION 1 – MESURES DE SECURITE POUR LE CHAUFFAGE PAR INDUCTION

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⚠ AVERTISSEMENT

LE CHAUFFAGE PAR INDUCTION peut être dangereux.

PRENDRE LES MESURES NECESSAIRES POUR EVITER LES RISQUES DE BLESSURES GRAVES, VOIRE MORTELLES. TENIR LES ENFANTS A DISTANCE. LES PORTEURS D'UN STIMULATEUR CARDIAQUE DOIVENT PREALABLEMENT CONSULTER LEUR MEDECIN.

Pendant les opérations de chauffage, comme dans la plupart des activités, l'opérateur s'expose à certains dangers. Le chauffage n'est pas dangereux à condition de prendre certaines mesures. Les consignes de sécurité indiquées ci-après ne sont qu'un résumé des informations plus détaillées se trouvant dans les normes de sécurité énumérées à la page suivante. Lire et respecter toutes les normes de sécurité.

LES OPERATIONS D'INSTALLATION, DE FONCTIONNEMENT, DE MAINTENANCE ET DE REPARATION NE DOIVENT ETRE CONFIEES QU'A DU PERSONNEL QUALIFIE.

Danger de mort PAR ELECTROCUTION.

Le contact de composants électriques peut provoquer des accidents mortels ou des brûlures graves. Le circuit de puissance et les connexions de sortie sont sous tension lorsqu'on active la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur marche. Des équipements installés ou reliés à la borne de terre de manière incorrecte sont dangereux.

1. Ne pas toucher des composants électriques sous tension.
2. Envelopper les connexions et raccords de refroidissement pour éviter tout contact accidentel.
3. Porter des gants d'isolation secs, sans trous, et une protection corporelle.
4. Isolez-vous de la pièce et du sol avec des tapis ou des couvertures d'isolation suffisamment grands pour prévenir tout contact physique avec la pièce ou la terre.
5. Déconnecter l'alimentation avant d'installer l'appareil ou d'en effectuer l'entretien. Verrouiller ou étiqueter la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (se reporter aux Principales normes de sécurité).
6. Utiliser seulement des tuyaux non conducteurs avec une longueur minimale de 460 mm pour assurer l'isolement.
7. Installer et mettre cet équipement correctement à la terre conformément au manuel utilisateur et aux codes nationaux, gouvernementaux et locaux.
8. Vérifier souvent la terre de l'alimentation – contrôler et s'assurer que le conducteur de terre du câble d'alimentation est correctement relié à la borne de terre dans le boîtier de déconnexion ou que le connecteur est branché à une sortie de boîtier correctement mise à la terre.
9. En réalisant des connexions d'entrée brancher d'abord le conducteur de terre approprié – contrôler deux fois les connexions.
10. Vérifier souvent le bon état du câble d'alimentation ou l'isolation des fils – remplacer le câble immédiatement s'il est endommagé – des fils dénudés peuvent provoquer des accidents mortels.
11. Arrêter tous les équipements lorsqu'ils ne sont pas utilisés.
12. Ne pas utiliser des câbles usés, endommagés, sous dimensionnés ou mal épissés.
13. Ne pas porter les câbles autour de votre corps.
14. Ne pas toucher le circuit électrique si vous êtes en contact avec la pièce, la terre ou le circuit électrique d'une autre machine.
15. Utiliser seulement des équipements bien entretenus. Réparer ou remplacer immédiatement des composants endommagés. Effectuer des travaux d'entretien sur l'appareil selon le manuel.
16. Porter un harnais de sécurité pour effectuer des travaux au-dessus du sol.
17. Maintenir solidement en place tous les panneaux et couvercles.

LE CHAUFFAGE PAR INDUCTION peut provoquer des blessures ou des brûlures au contact de PIECES CHAUDES OU DE L'EQUIPEMENT.

1. Ne pas toucher ou manipuler la tête/l'enroulement à induction pendant le fonctionnement.
2. Tenir les bijoux et autres objets personnels en métal éloignés de la tête/de l'enroulement pendant le fonctionnement.
3. Laisser refroidir les composants ou équipements avant de les manipuler.

LE CHAUFFAGE PAR INDUCTION peut provoquer un incendie.

1. Ne pas surchauffer les composants ni les adhésifs.
2. Attention aux risques d'incendie: tenir un extincteur à proximité.
3. Stocker des produits inflammables hors de la zone de travail.

La mise en place de l'appareil sur, au-dessus ou à proximité de surfaces inflammables peut être source d'INCENDIES OU d'EXPLOSION.

1. Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
2. Ne pas installer l'appareil à proximité de produits inflammables
3. Ne pas faire fonctionner l'appareil en atmosphère explosive.

DES FUMEES ET DES GAZ peuvent être dangereux pour votre santé.

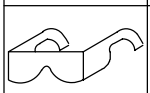
Le chauffage à induction génère des fumées et des gaz. Leur inhalation peut être dangereuse pour votre santé.

1. Eloigner la tête des fumées. Ne pas respirer les fumées.
2. A l'interieur, ventiler la zone et/ou utiliser un extracteur pour l'évacuation des fumées et des gaz.
3. Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
4. Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les adhésifs, les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
5. Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz provenant du chauffage peuvent déplacer l'air, abaisser le niveau d'oxygène, et provoquer des lésions ou des accidents mortels. S'assurer que l'air ambiant ne présente aucun danger.
6. Ne pas chauffer dans des endroits se trouvant à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur peut réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
7. Ne pas chauffer des métaux munis d'un revêtement tels que l'acier galvanisé, plaqué au plomb ou au cadmium, à moins que le revêtement ne soit enlevé de la zone chauffée, que la zone soit bien ventilée et, si nécessaire, en portant un respirateur. Les revêtements et tous les métaux contenant ces éléments peuvent dégager des fumées toxiques s'ils sont chauffés.

1-1. Dangers supplémentaires de mise en route, de fonctionnement et d'entretien

LA CHUTE DE MATERIEL peut provoquer des blessures personnelles graves et endommager les équipements.

1. Utiliser la poignée et demander à une personne ayant la force physique nécessaire pour soulever l'appareil.
2. Déplacer l'appareil à l'aide d'un charriot ou d'un engin similaire.
3. Pour les appareils sans poignée utiliser un équipement d'une capacité appropriée pour soulever l'appareil.
4. En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



LA PROJECTION DE PIECES DE METAL ou DE COLLE peut provoquer des blessures aux yeux.

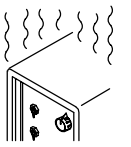
1. Porter des lunettes de protection avec des protections latérales.

DES ORGANES MOBILES peuvent provoquer des blessures.

1. S'abstenir de toucher des organes mobiles tels que des ventilateurs.
2. Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.

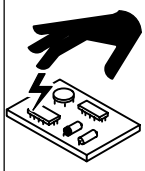
DES CHAMPS MAGNETIQUES CREES PAR DES COURANTS ELEVES peuvent affecter le fonctionnement du stimulateur cardiaque.

1. Porteurs de stimulateur cardiaque, restez à distance.
2. Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de chauffage à induction.



UNE UTILISATION INTENSIVE peut provoquer un SURCHAUFFEMENT DU MATERIEL.

1. Prévoir une période de refroidissement
2. Réduire le courant de sortie ou le facteur de marche avant de recommencer le chauffage.
3. Respecter le facteur de marche nominal.

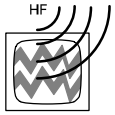


L'ELECTRICITE STATIQUE peut endommager les composants des tableaux électriques.

1. Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
2. Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.

Il subsiste DU COURANT CONTINU IMPORTANT après la mise hors tension de l'alimentation électrique.

1. Avant de toucher des organes internes, arrêter la source électrique, débrancher l'alimentation, et décharger les condensateurs d'alimentation conformément aux instructions indiquées dans la partie maintenance.



LE RAYONNEMENT HAUTE FREQUENCE peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.

- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence.

1-2. Informations concernant les champs électro-magnétiques (Information EMF)

Considérations relatives au chauffage à induction et aux effets des champs électriques et magnétiques basse fréquence.

Le texte suivant est extrait des conclusions générales Département du Congrès U.S., Office of Technology Assessment, *Effets biologiques des champs magnétiques et électriques basse fréquence – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . on dispose maintenant d'importantes découvertes scientifiques reposant sur des expériences effectuées dans le domaine cellulaire et des études réalisées sur des animaux et des personnes qui démontrent clairement que des champs magnétiques basse fréquence peuvent avoir une interaction et produire des changements dans les systèmes biologiques. Alors que la plus grande partie de cet ouvrage est d'une très grande qualité, les résultats sont complexes. La compréhension scientifique courante ne nous permet pas encore d'interpréter la preuve fournie dans un seul ouvrage cohérent. Il est encore plus frustrant de ne pas pouvoir tirer des conclusions définitives en ce qui concerne les problèmes de risque possible ou de proposer des recommandations scientifiques claires pour des stratégies à suivre en vue de minimiser ou de prévenir des risques potentiels."

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :

4. Disposer le câble de sortie d'un côté à distance de l'opérateur
5. Ne pas enrouler ou draper le câble électrique autour du corps.
6. Placer la source de courant et le câble le plus loin possible de l'opérateur.

En ce qui concerne les stimulateurs cardiaques

Les procédures ci-dessus concernent également les porteurs de stimulateur cardiaque. Consulter votre médecin pour un complément d'information.

PRINCIPALES NORMES DE SÉCURITÉ

Normes de sécurité et de santé, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Code électrique national, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Code électrique du Canada, partie 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard,Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

SECTION 2 – INTRODUCTION

The Induction Heating Temperature Station (IH/TS) is designed to be used with Induction Heating Systems for pre-heat and post-heat (stress relieving) applications. The station is built in two different configurations; as a controller only or as a controller with a digital recorder.

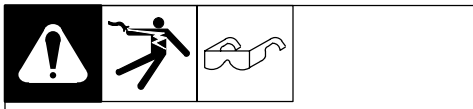
The controller in the IH/TS comes pre-programmed from the factory with a typical stress relieving temperature profile that can be easily changed to match specific customer stress relief requirements. Also, the controller can be programmed to operate in a pre-heat mode. These instructions will guide the operator in the proper use of the station which includes programming and setting up the controller, and operating the recorder.

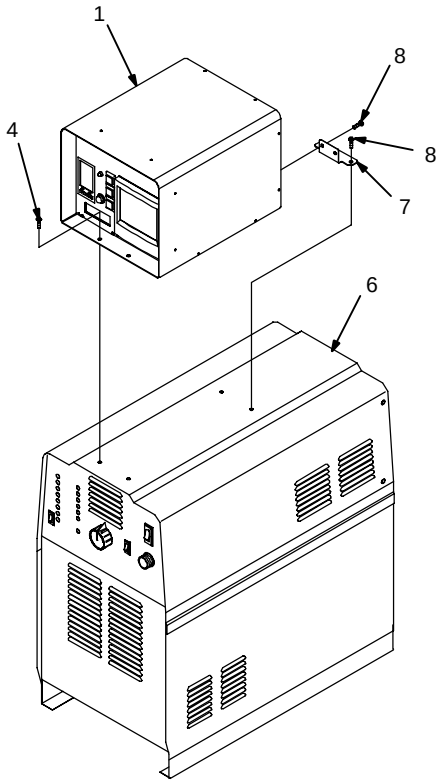
SECTION 3 – INSTALLATION

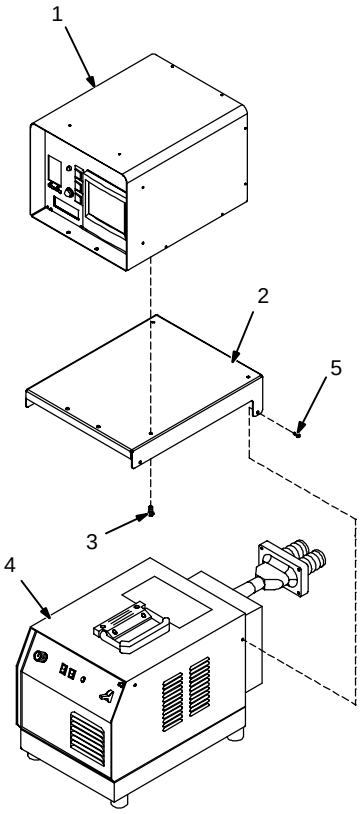
3-1. Specifications

Specification	Description
Overall Dimensions	Height: 10 in (254 mm); Width: 14-1/2 in (368 mm); Depth: 16 in (406 mm)
Weight	Net: IH/TS (no recorder) 13.1 lb (5.9 kg); IH/TS (digital recorder) 21.1 lb (9.6 kg)
Type Of Input Power	24 Volts DC, 115 Volts AC
Memory Capacity	One Program Up To 8 Segments
Control Capacity	Single Power Source Control
Operating Temperature Range	41° To 104° F (5° To 40° C)
Storage Temperature Range	–4° To 122° F (–20° To 50° C)
Reference the controller and recorder manuals for additional information.	

3-2. IH/TC Installation







▲ **Turn Off and disconnect input power.**

5 kW System

1. Temperature Control/Recorder
2. 5kW Mounting Bracket
3. Screw, 10-32 (4)

Install and secure IH/TS to mounting bracket using supplied #10 screws.

4. 5kW Power Source Case
5. Case Sheet Metal Screw (4)

Remove case sheet metal screws from both top left and right sides of unit. Install mounting bracket to power source and secure by reinstalling sheet metal screws.

25 kW System

6. 25 kW Power Source Case
7. Rear Mounting Bracket
8. Screw, 1/4-20 (2)

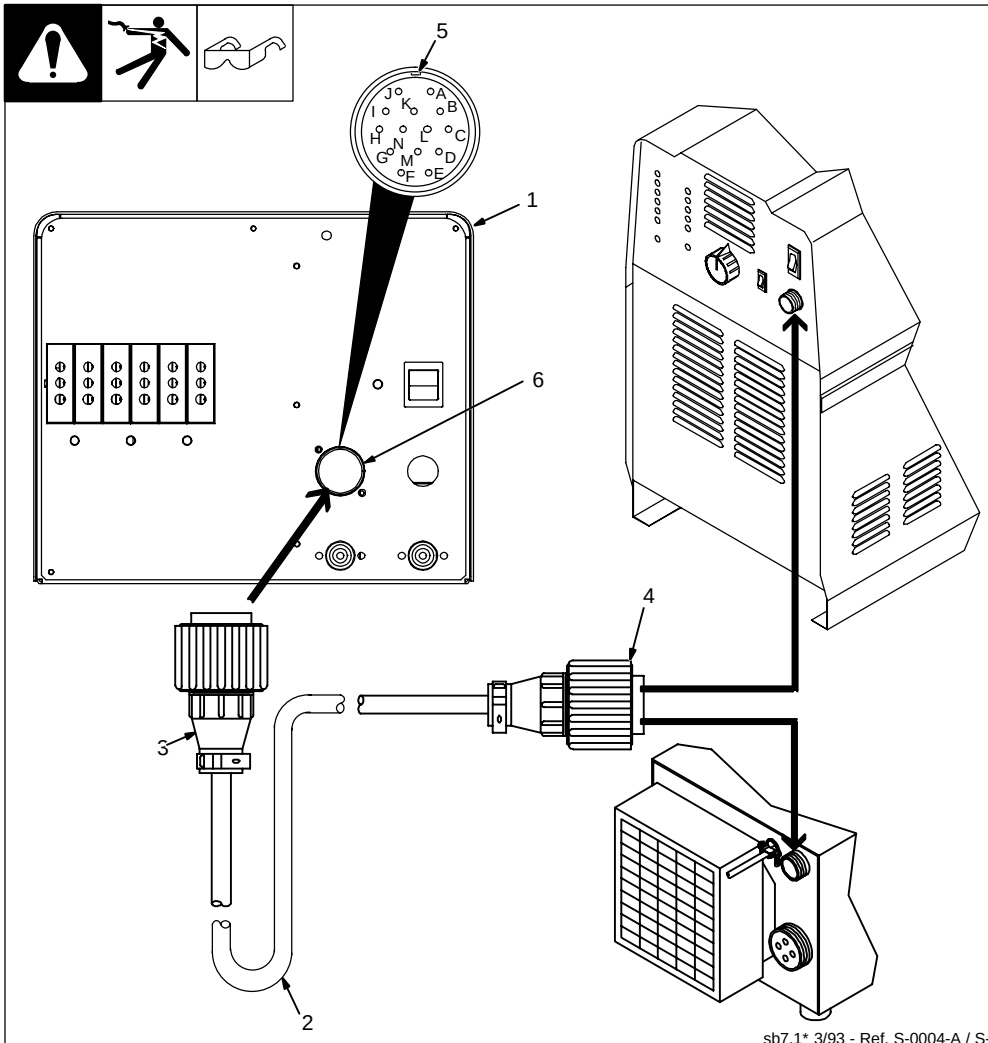
Remove front and middle mounting screws from top of Item 6 case. Locate IH/TS and reinstall front mounting screws. Locate rear mounting bracket, and secure with supplied 1/4-20 screws. Reinstall middle mounting screws to secure bracket to case.

Tools Needed:

3/8, 5/16 in

Ref. 802 905-A / 802 900

3-3. Connecting To Power Source



Turn Off power source.

1. IH/TS
2. Interconnecting Cord
3. 14-Socket Plug
4. 14-Pin Plug

Obtain cord with 14-socket plug on one end and 14-pin plug on other end.

5. Keyway
6. Remote 14 Receptacle RC1 (See Section 3-4)

To connect cord to a receptacle, align keyway, insert plug, and tighten threaded collar.

To connect remaining end of cord to power source, align keyway, insert plug, and tighten threaded collar.

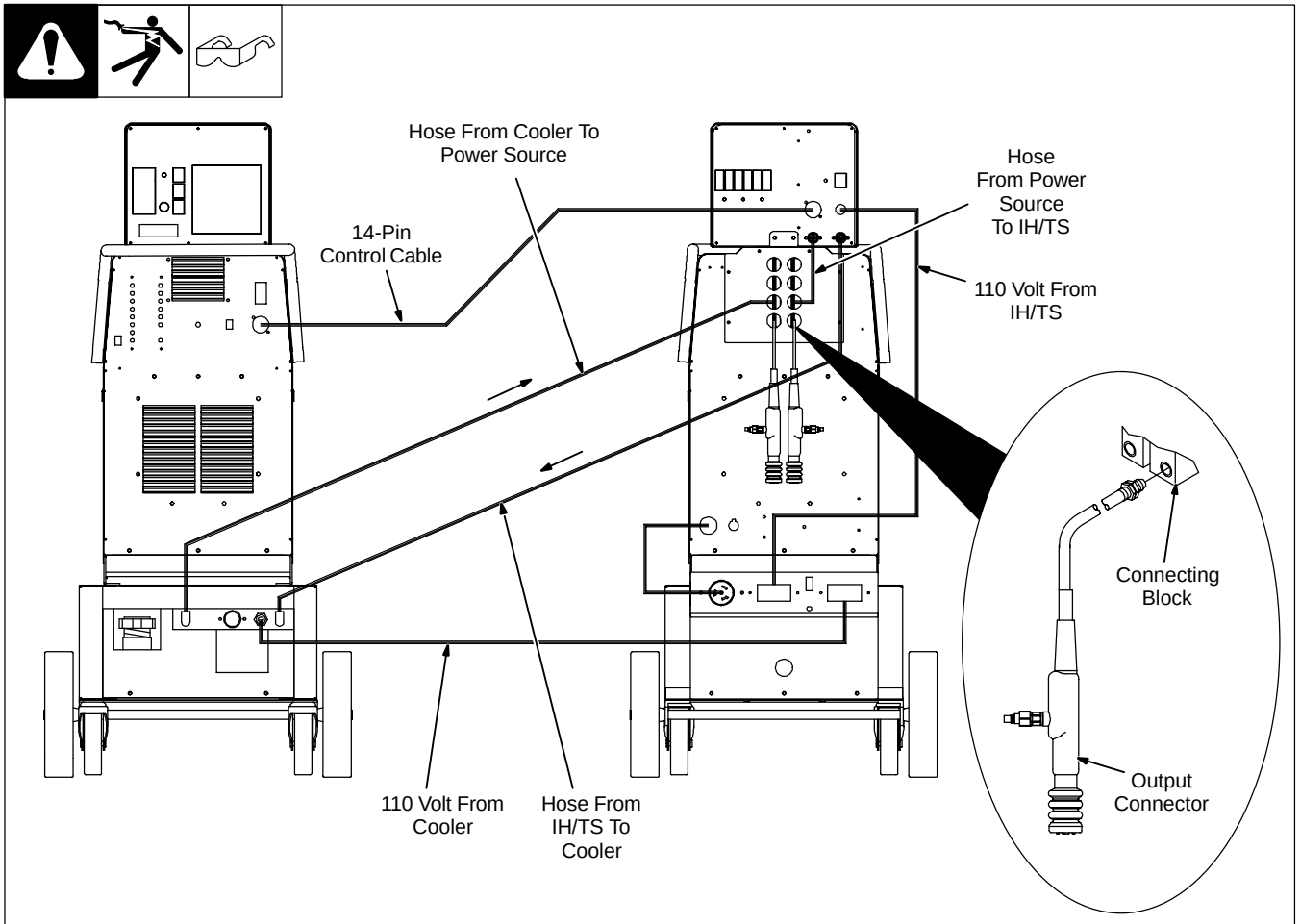
sb7.1* 3/93 - Ref. S-0004-A / S-0750 / Ref. 802 926 / Ref. 801 049 / 801 825-B

3-4. Input 14 Pin Information For Receptacle RC1

REMOTE 14	Pin	Pin Information
Remote Contactor	A	+24 volts dc from power source.
	B	Contact closure to A completes power source +24 volts dc contactor control circuit.
Remote Output Control	D	Control circuit common.
	E	0 to +10 volts dc signal for power source output control.
Power Source Fault	F, J	Absence of contact closure from power source indicates power source output failure.
Remote Metering*	I	Actual frequency input signal.
	L	Average power input signal.
	M	Voltage input signal RMS.
	N	Current input signal RMS.

*See power source Owner's Manual for scaling information.

3-5. Connecting 25kW System Cords And Cables


Hose From Cooler To Power Source
14-Pin Control Cable
Hose From Power Source To IH/TS
110 Volt From IH/TS
Connecting Block
Output Connector
110 Volt From Cooler
Hose From IH/TS To Cooler

Connect the power output cable and coolant lines as shown.

Connect 110-volt power cable as shown.

Plug the 110-volt cooler power cord into the duplex at the rear of the power source cart. On the 25kW system, the cooler must be plugged into the right side duplex. This is identified with a label that reads “switched receptacle.” The ON-OFF switch located to the left operates this plug.

The IH/TS Control is plugged in the left side duplex. Do not use these duplex connections for operating auxiliary tools, such as grinders, drills, lights, etc.

Remove the output block cover.

Route output power cables through the lower holes in the output block cover.

Connect output power cables to the output terminals.

Route the “coolant out” (medium length) line from the cooler and the “coolant in” (short length) line to the IH/TS through the next set of holes in the output block cover.

☞ *All coolant connections have 5/8-18 left-hand threads.*

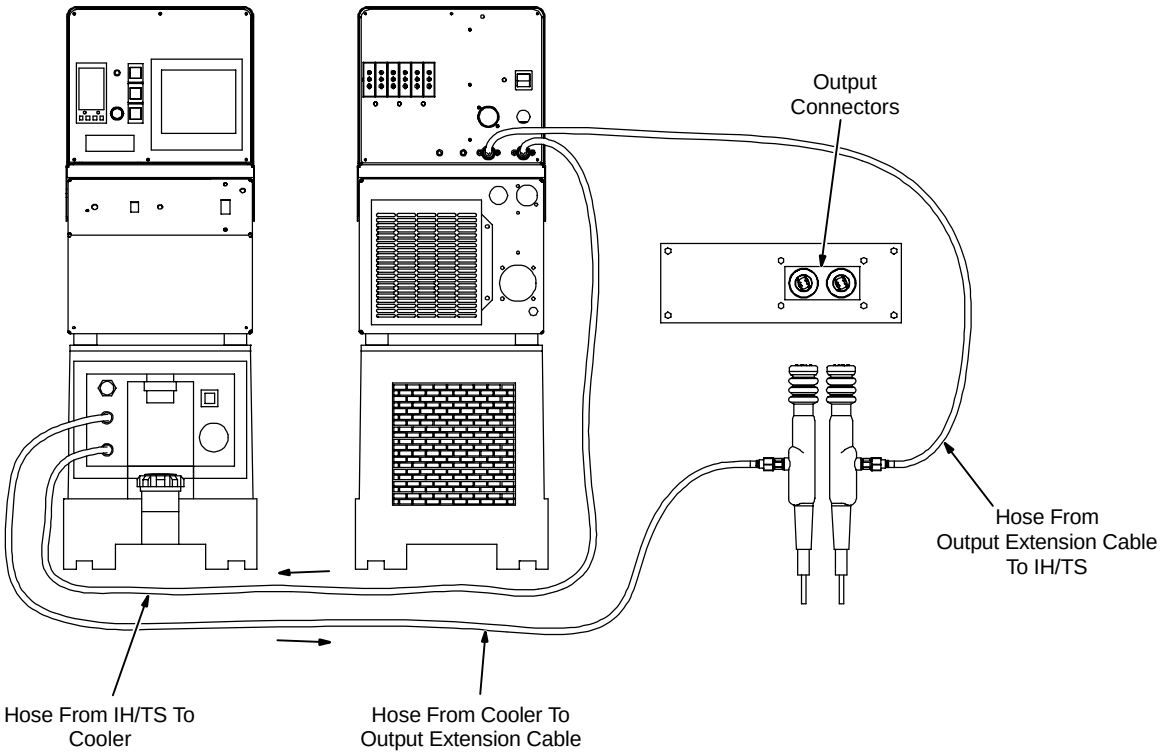
- Attach the “coolant out” (long length) line from the IH/TS to the “coolant in” line on the cooler.

▲ **Be sure to replace output block cover after installing the coolant and power lines.**

- Replace the output block cover.

803 036-A

3-6. Connecting 5kW System Cords And Cables



Connect the power output cable and coolant lines as shown.

Connect 110-volt power cable as shown.

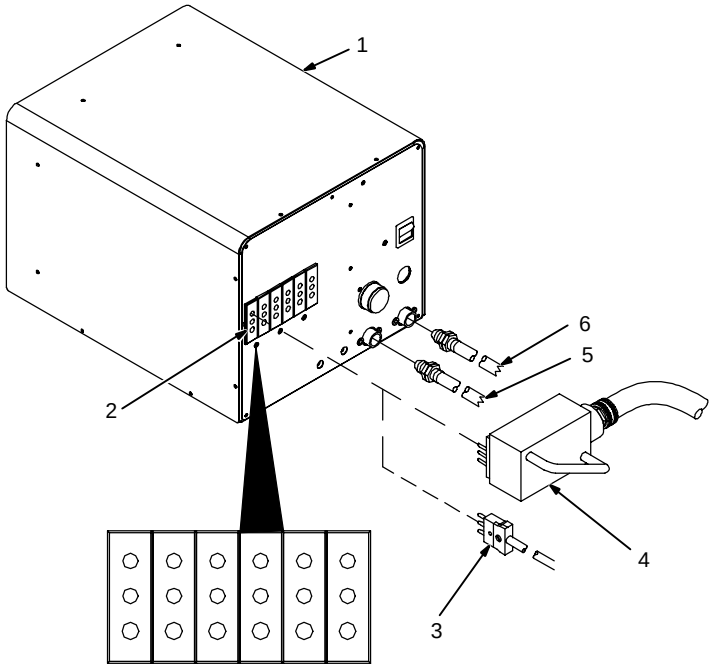
Plug the 110-volt cooler power cord into the duplex at the rear of the power source cart.

The IH/TS Control is plugged in the left side duplex. Do not use these duplex connections for operating auxiliary tools, such as grinders, drills, lights, etc.

- Connect the “coolant out” line from the cooler directly to the output extension cable.
- Connect the “coolant in” line on the IH/TS directly to the remaining output extension cable connection.
- Connect the “coolant out” line from the IH/TS to the “coolant in” line on the cooler.

803 040

3-7. Connecting External Device



The IH/TS must have (as a minimum) one thermocouple connected to receptacle TC1. If multiple thermocouples are desired, either use individual thermocouple plugs or the thermocouple extension cable.

To connect thermocouples to the control, proceed as follows:

Turn Off power source.

1. Temperature Controller
2. Thermocouple Receptacles
3. Individual Thermocouple Plug
4. Thermocouple Extension Cable

Align plug pins with receptacle sockets and push plug into receptacle.

5. Coolant Out Line From Cooler
6. Coolant In Line To Cooler

The IH/TS is supplied with an internal coolant flow switch. Coolant hoses must be connected to the IH/TS for proper operation. Connect coolant hoses (supplied with post-heat systems) to coolant fittings on unit as described in Section 3-5.

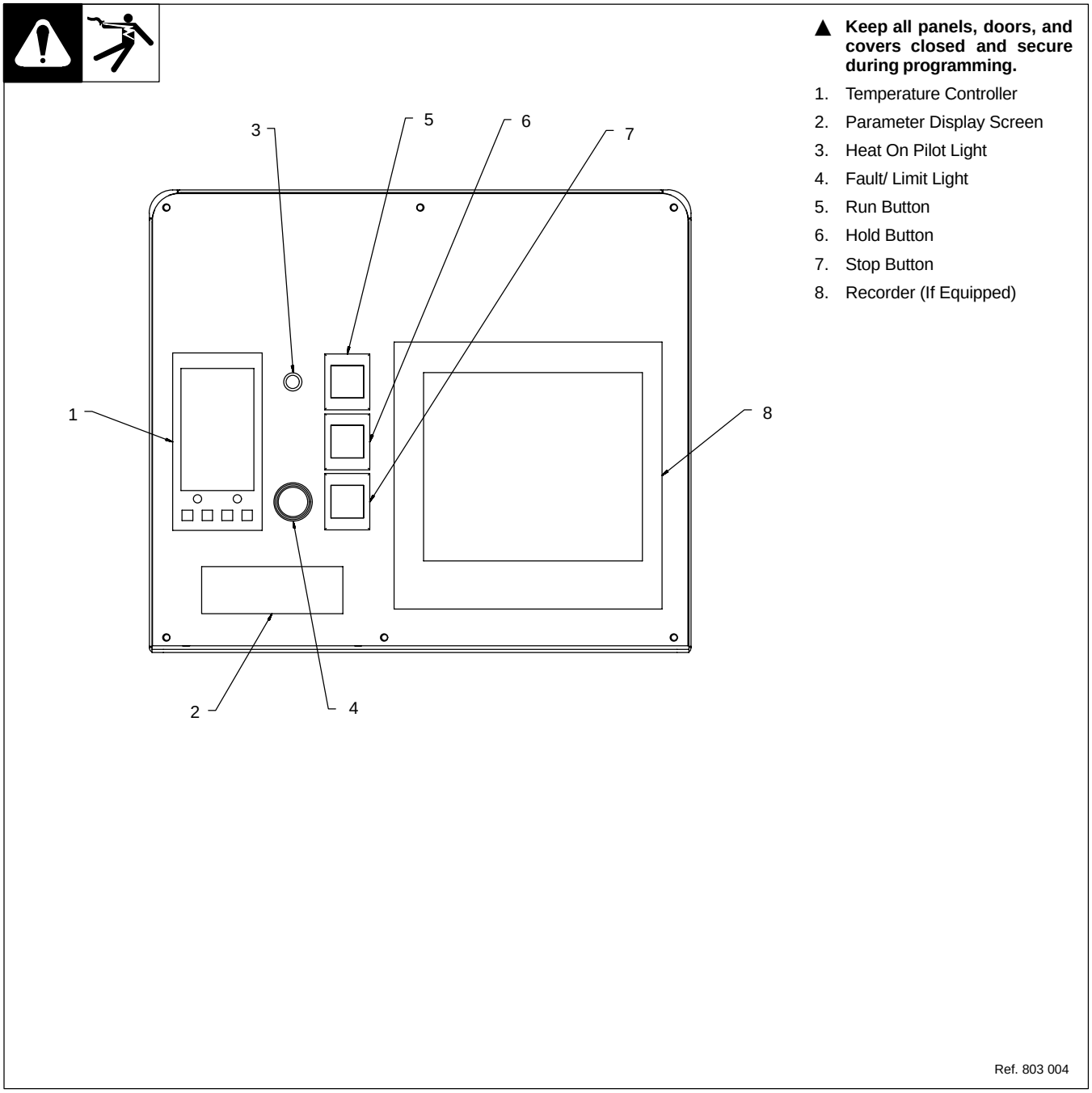
Tools Needed:

11/16 in

Ref. 803 003-A

SECTION 4 – COMPONENTS AND CONTROLS

4-1. IH/TS Front Panel

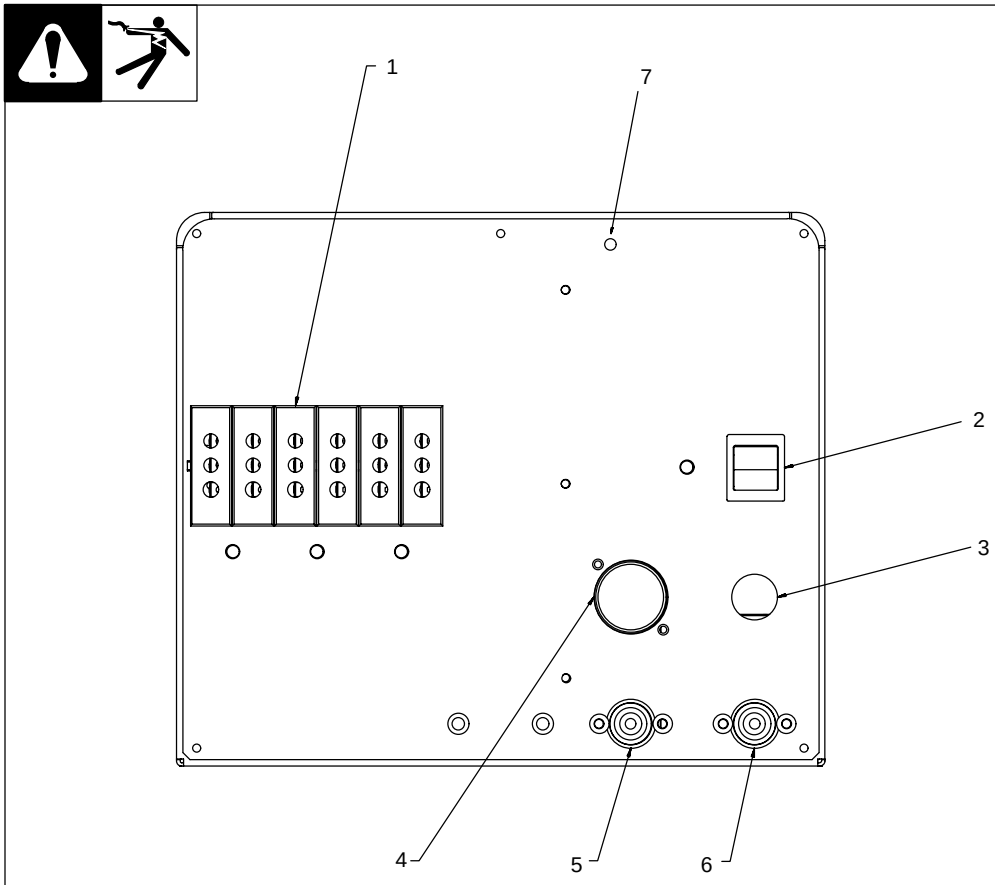


▲ **Keep all panels, doors, and covers closed and secure during programming.**

1. Temperature Controller
2. Parameter Display Screen
3. Heat On Pilot Light
4. Fault/ Limit Light
5. Run Button
6. Hold Button
7. Stop Button
8. Recorder (If Equipped)

Ref. 803 004

4-2. IH/TS Rear Panel

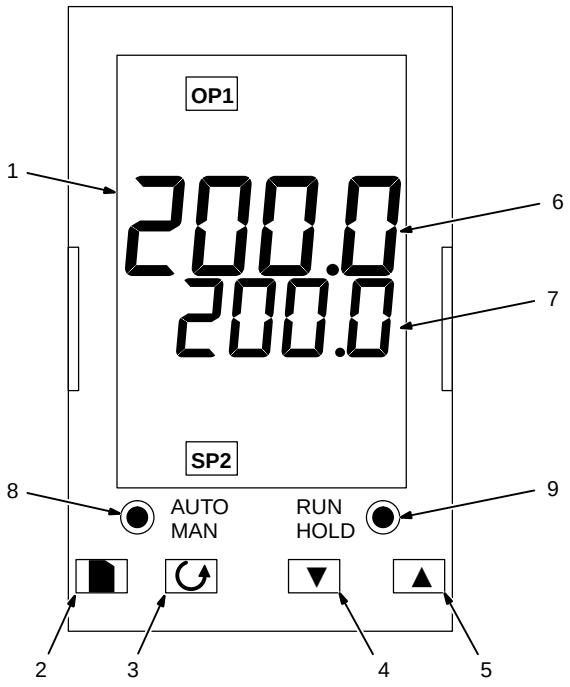


▲ **Keep all panels, doors, and covers closed and secure during programming.**

1. Thermocouple Connectors
2. On/Off Power Switch
3. 115 VAC Power Cord
4. 14-Pin Receptacle
5. Coolant Flow Switch “IN” Fitting
6. Coolant Flow Switch “OUT” Fitting
7. Power Source Select Switch

Ref. 803 004

4-3. Controller

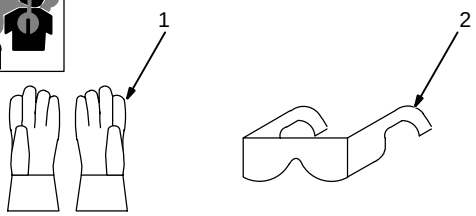


▲ **Keep all panels, doors, and covers closed and secure during programming.**

1. Digital Display
2. Page Forward Button
3. Scroll Button
4. Down Button
5. Up Button
6. Actual Temperature
7. Setpoint Temperature
8. Auto/Man Button (Disabled)
9. Run/Hold Button (Disabled)

SECTION 5 – SETUP AND OPERATION

5-1. Safety Equipment



Wear the following during operation:

1. Dry, Insulating Gloves
2. Safety Glasses With Side Shields

DO NOT wear rings or watches during operation:

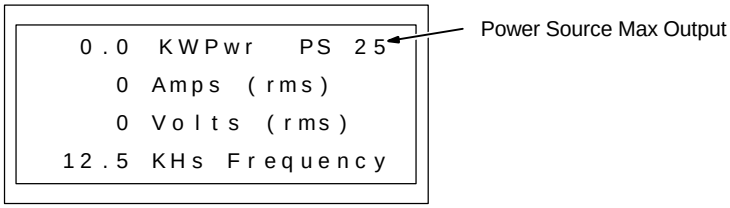
sb3.1* 1/94

5-2. IH/TS Setup

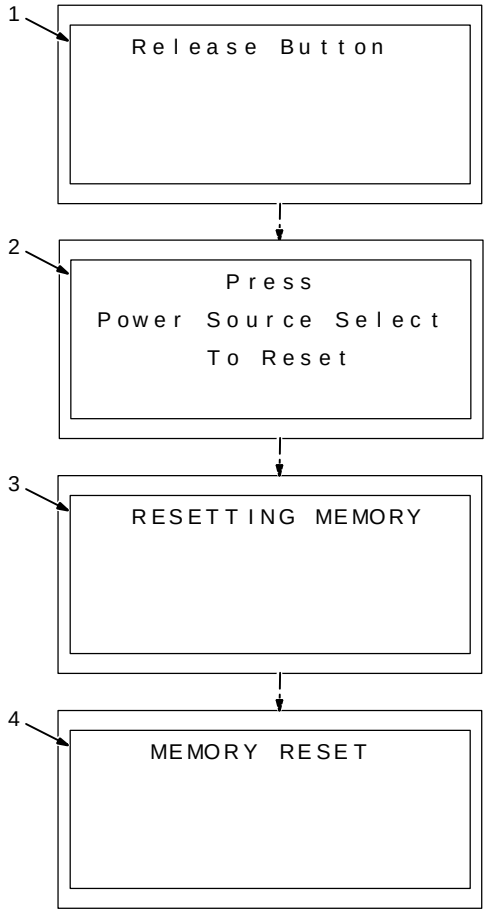
5-2-1. Select Power Source

Energize the power source, cooler, and IH/TS. A power source selection will appear in the top right corner of the IH/TS front panel Parameter Display. Press the recessed Power Source Select button on the IH/TS rear panel to toggle through and select the appropriate power source maximum output. This selection will provide the proper output scaling for the power source in this application.

Parameter Display



5-2-1-1. Resetting All RAM Variables



☞ *This procedure will reset all stored variables in RAM memory including scaling, programs, counters, and security code.*

Before turning on power at the power source, press Power Source Select button.

Turn on power at power source.

1 Release Button Display

When "Release Button" appears on the display, release the button.

2 Press Power Source Select To Reset Display

After the display changes to "Press Power Source Select To Reset", press Power Source Select button to reset all stored variables in RAM.

3 RESETTING MEMORY Display

"RESETTING MEMORY" will appear on the display automatically during the RAM memory reset operation.

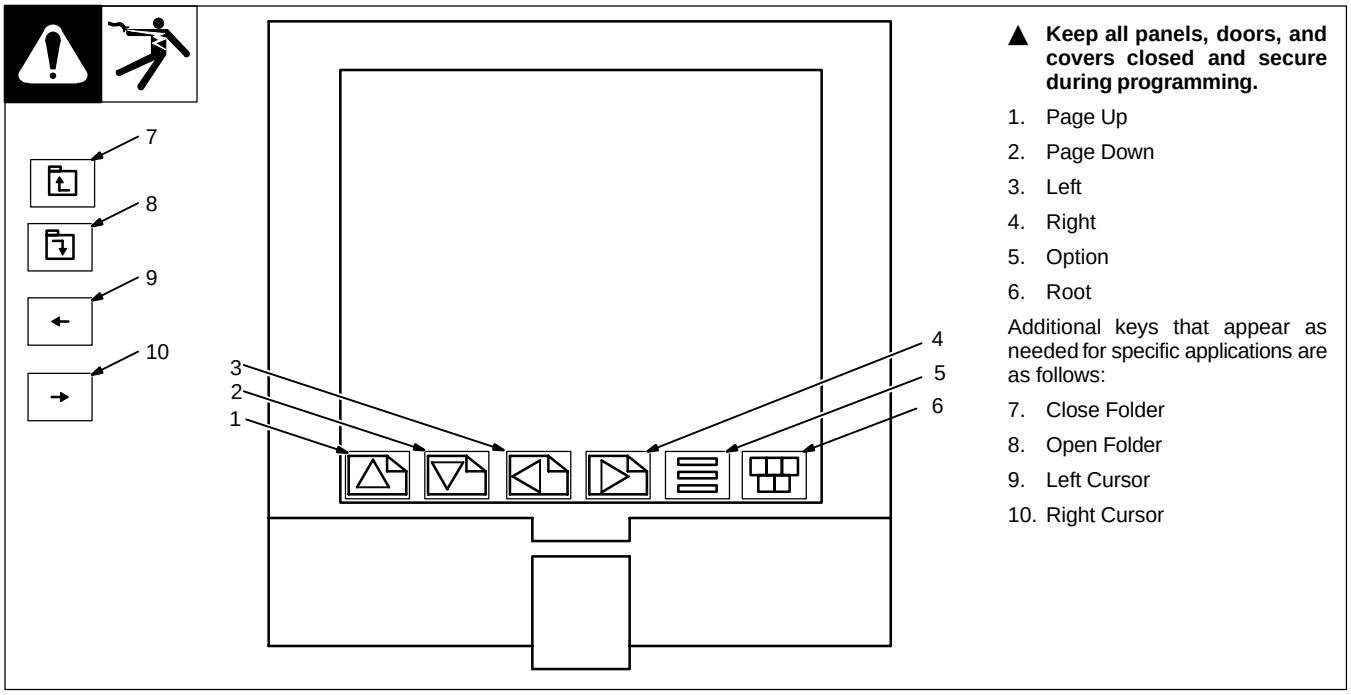
4 "MEMORY RESET" Display

"MEMORY RESET" will appear on the display after completion of RAM memory reset.

The IH/TS will restart with factory set default parameters in RAM memory.

5-2-2. Time Date Setup – Digital

5-2-2-1. Digital Recorder Controls



▲ **Keep all panels, doors, and covers closed and secure during programming.**

1. Page Up
2. Page Down
3. Left
4. Right
5. Option
6. Root

Additional keys that appear as needed for specific applications are as follows:

7. Close Folder
8. Open Folder
9. Left Cursor
10. Right Cursor

5-2-2-2. Login As Engineer

1. Touch top left corner (Logged Out) or (Operator).
2. Touch Blue text (pull down menu) next to User.
3. Touch Engineer.
4. Touch Pasword field.
5. Touch Numeric.
6. Touch 1, then 0, and finally Ok.

5-2-2-3. Go To Operator Screen

1. Touch key in bottom right corner to open Root Menu.
2. Touch Operator.

5-2-2-4. Date Setup

1. Touch System.
2. Touch Locale.
3. Touch pull down next to Country.
4. Touch appropriate country.
5. Touch pull down next to Time Zone.
6. Touch appropriate time zone (i.e. CST Central). See “http://www.timeanddate.com” for additional information.
7. Set DST (Daylight Savings Time) if applicable. Place an “X” in the box next to “Use Summertime (DST)” to enable this option.

NOTE ☞	*In general, for those locations that observe DST:* *DST begins at 2:00 am on the first Sunday in April.* *DST ends at 2:00 am on the last Sunday in October.* *See "http://deil.lang.uiuc.edu/web.pages/holidays/DST.html for exceptions.*

8. Touch Apply.

5-2-2-5. Time Setup

1. Touch System.
2. Touch Clock.
3. Adjust time, if necessary.
4. Touch Apply.

5-2-2-6. Login As Operator

1. Touch top left corner (Engineer).
2. Touch pull down next to User.
3. Touch Operator.

5-2-2-7. Go To Home Screen

1. Touch key in bottom right corner to open Root Menu.
2. Touch Home.

5-3. Operation

1. Energize IH/TS, power source, and cooler.
2. Set up Temperature Profile – per code requirements (see Section 5-3-1 Programming The 2408 Controller).
3. Start recording
   Digital Recorder (see Section 5-3-2. Batch Recording On The 5100 Digital Recorder)
4. Run the heat process (see Section 5-3-3. Running A Heat Treat and the following tables).

Table 5-1. Controller Display Definitions

Name	**Description**
	Home List (extra parameters may be present if promote feature was used.)
Home	Measured value and Setpoint
OP	% Output level

run	PrOGrAm run lIst
StAt	Program status (OFF, run, hold, HbAc, End)
PSP	Programmer setpoint
SEG	Active segment number
StYP	Active segment type
SEG.t	Segment time remaining in the segment units
tGt	Target setpoint
rAtE	Ramp rate (if a rate segment)
PrG.t	Program time remaining in hours
SEG.d	*Flash active segment type in the lower readout of the home display (no/YES)
*This parameter can only be changed when the program is in reset.	

5. Recover from an interruption, if applicable (see Section 5-3-4. Recovering From An Interruption).
6. Retrieve data
   Digital Recorder (see Section 5-3-2-4. Batch Recording On The 5100 Digital Recorder)
   View and print data (see Section 5-3-5 Review Software).

5-3-1. Programming The 2408 Controller

Identify the “code” requirements for the heat treat.

For Preheat program refer to Figure 5-1.

For Postweld stress relief program refer to Figure 5-2.

For a complex stress relief program (multiple temperature rise and cool rates) refer to Figure 5-3.

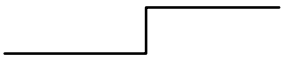
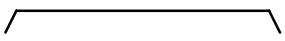
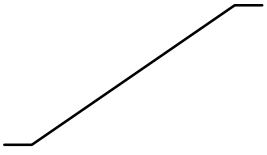
Use worksheet in Figure 5-4 to help prepare either a pre- or post-heat temperature profile.

Navigating

1. Press [ ] “Page” button until “ProG Li SE” appears on the display (see Section 7-3-2).
2. Press [ ] “Scroll” button to advance to each screen.
3. Use [▲] or [▼] “Up” or “Down” button to change values.

ProG	Default	Program Edit List
*Hb	bAnd	Holdback type (OFF, Lo, Hi , or bAnd)
♦Hb U	10	Holdback value (in display units)
rmP.U	Hour	Ramp units [(SEc , mi n, or Hour) for both rmP.r and rmP.t type segments]
dwL.U	Hour	Dwell units [(SEc , mi n, or Hour)
CYC.n	1	Number of program cycles (1 to 999, or “cont ”)
SEG.n		Segment number
tYPE		Segment type: (StEP) (dwEll) (rmP.t = ramp time) (rmP.r = ramp rate) (End)
*Window of operation at target temp ± the Hb units. ♦ Profile holds until temp comes within Hb U of target temp. Contactor shuts off if temp exceeds 25° above target temp. Profile advances when temp comes within Hb U of next segment.		

The following parameters depend on the tYPE selected, as shown below						
	StEP	dwEll	rmP.t	rmP.r	End	
Hb	√	√	√	√		Holdback type: OFF, Lo, Hi , or bAnd.
tGt	√		√	√		Target setpoint for a “rmP“ or “StEP” segment.
rAtE				√		Ramp rate for a “rmP.r ” segment.
dur		√	√			“dwEll” time / time to target for a “rmP.t ” segment.
End.t					√	End of prog – dwEll, rSEt, S OP.

Segment Type Definitions		
Step (StEP)		**The setpoint steps instantaneously** from its current value to a new value.
Dwell (dwEll)		**The setpoint remains constant** for a specified period.
Ramp Time (rmP.t) Ramp Rate (rmP.r)		**The setpoint ramps linearly**, from its current value to a new value, either at a set rate (called *ramp-rate programming*), or in a set time (called *time-to-target programming*). You must specify the ramp rate, or the ramp time, and the target setpoint, when creating or modifying a program.
End (End)		A program either ends in this segment or repeats. You specify which is the case when you create or modify a program (see the final topic in this chapter). When a program ends, the programmer is put into either a continuous Dwell state with all outputs staying unchanged, or the Reset state.

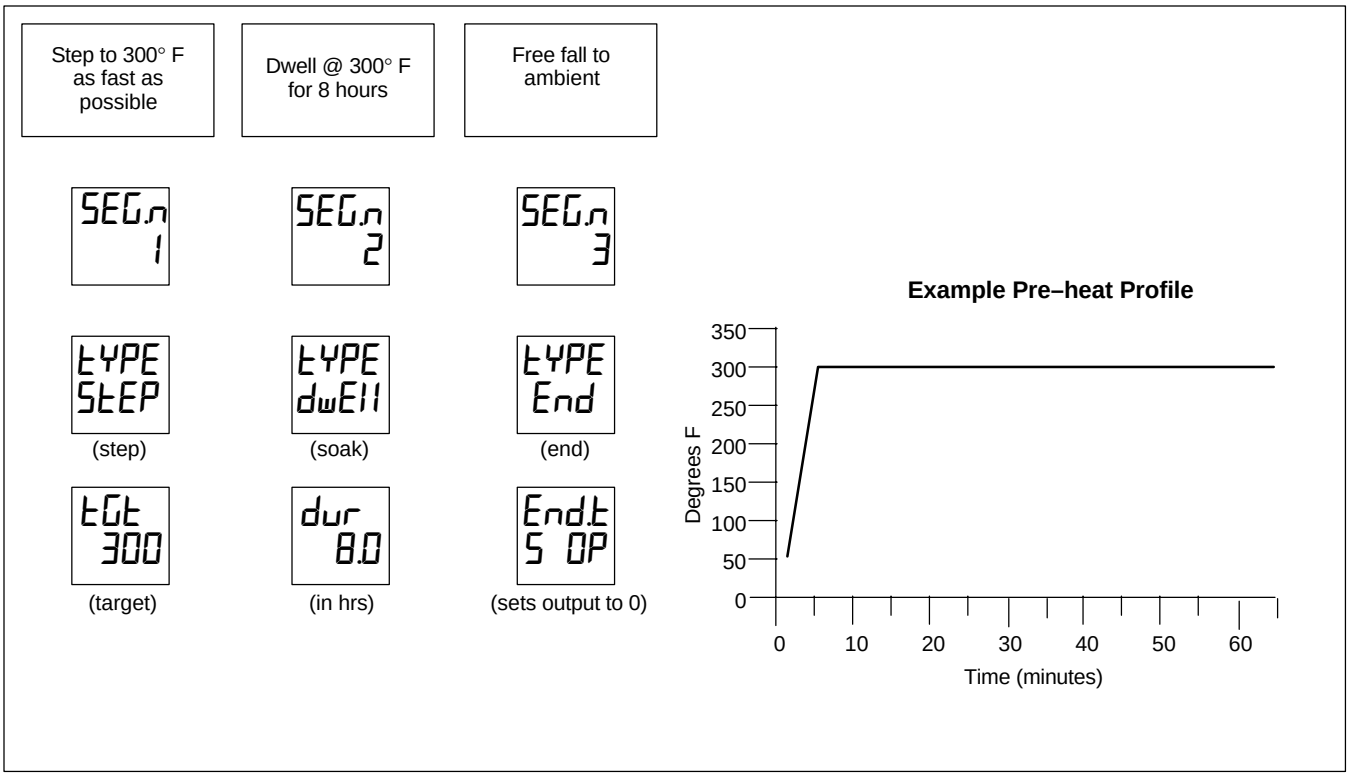


Figure 5-1. Setting Pre-heat Profile Using Example Parameters

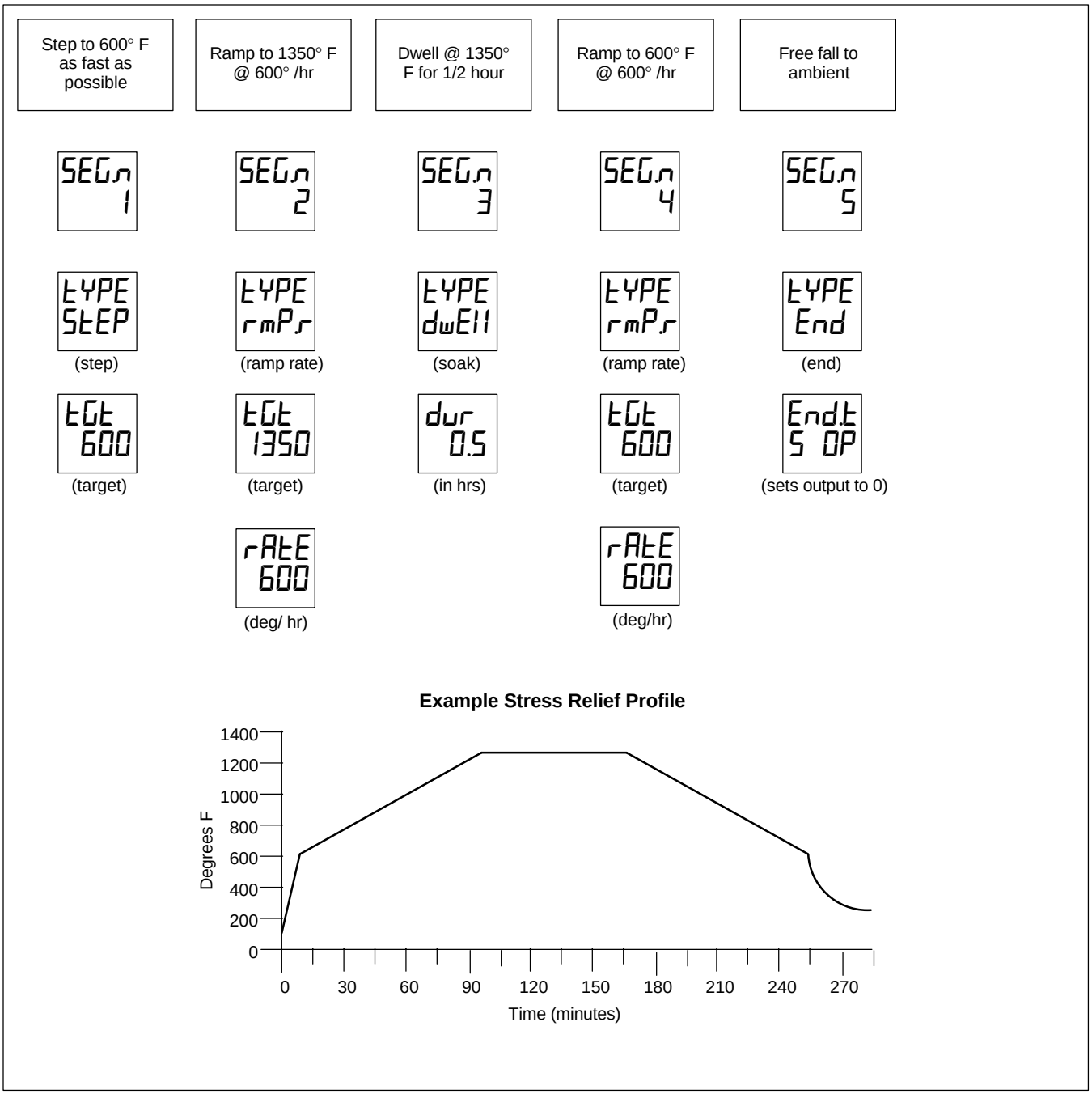


Figure 5-2. Setting Stress Relief Profile Using Example Parameters

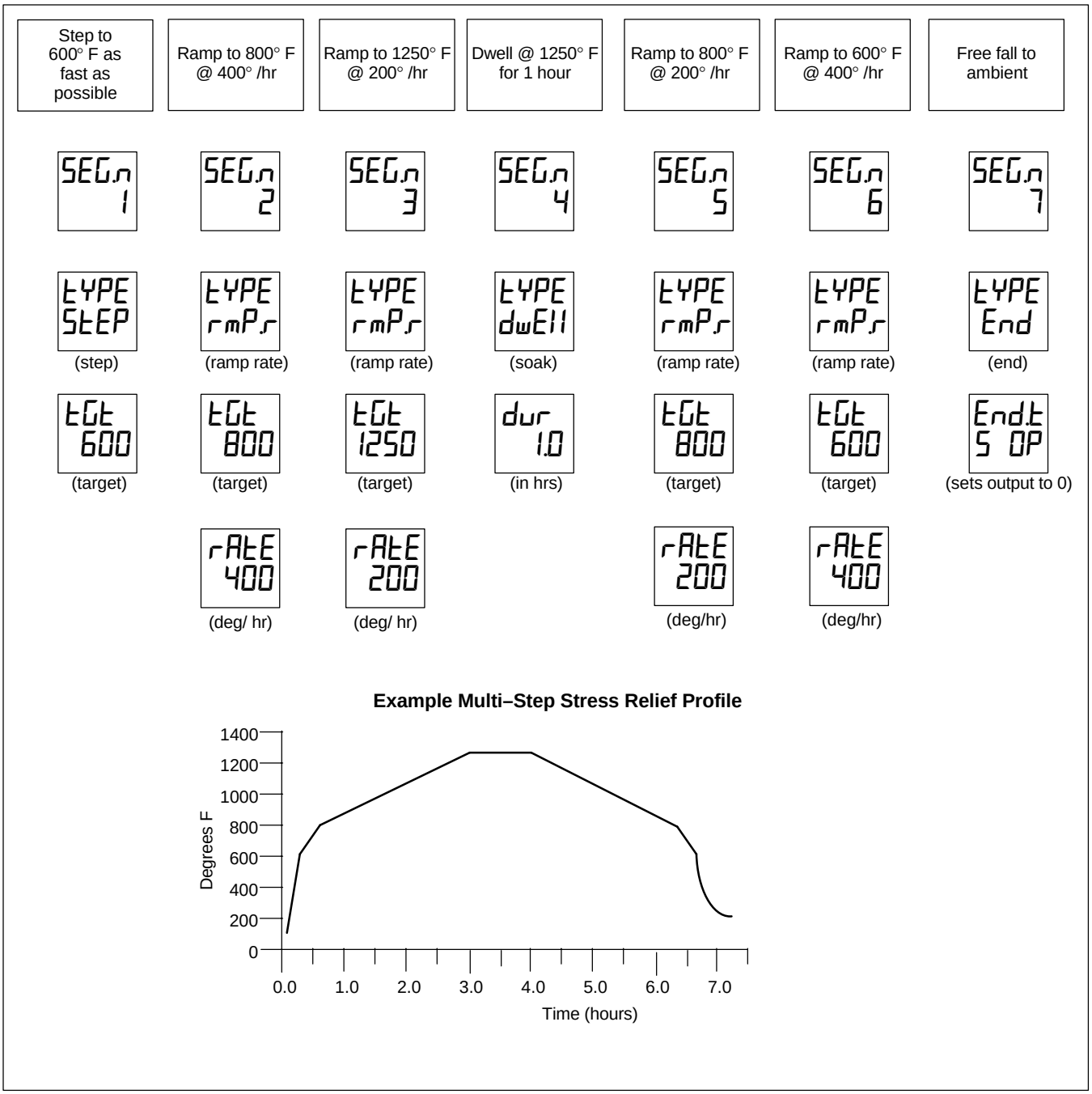
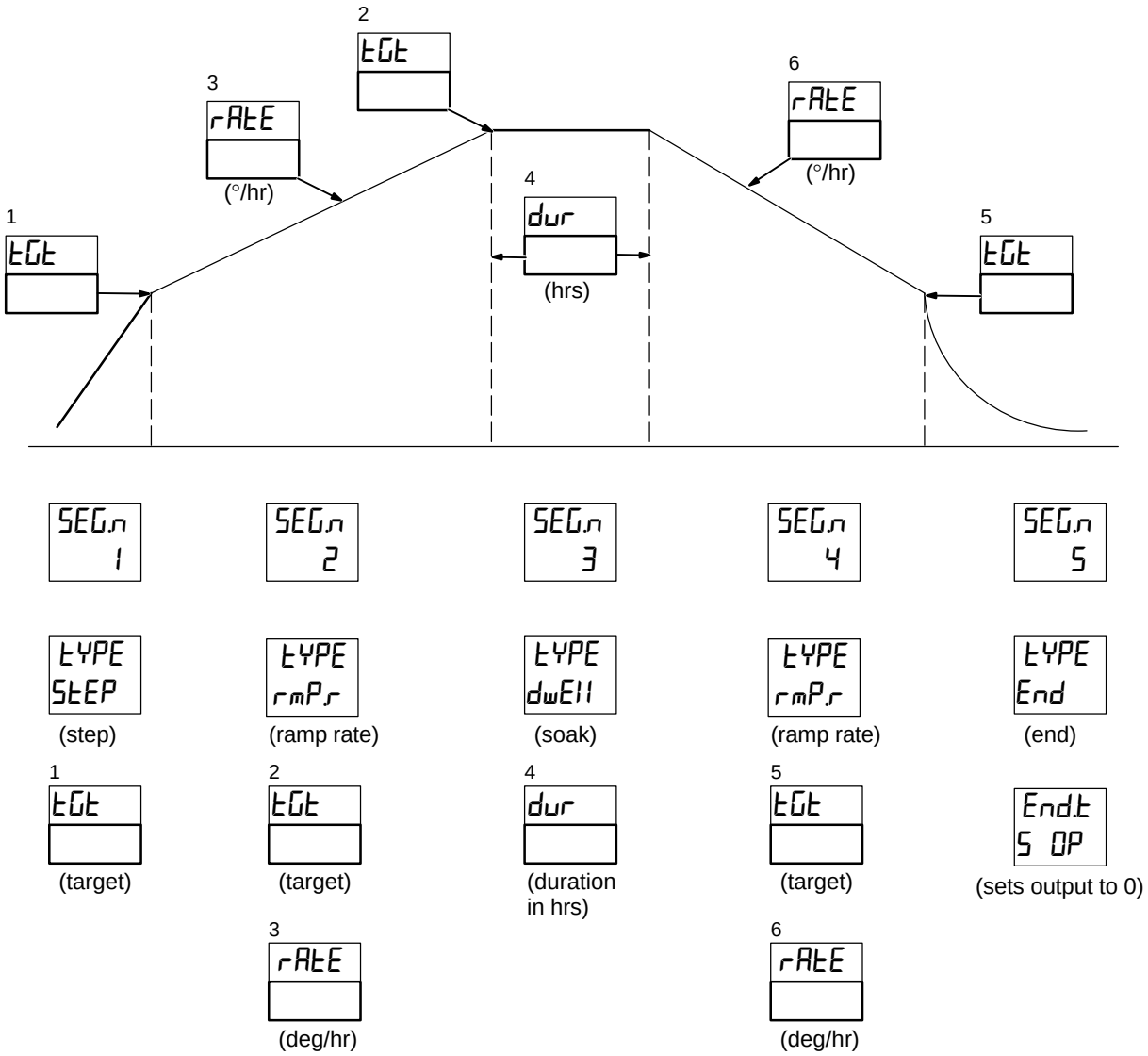


Figure 5-3. Setting A Complex Stress Relief Profile With Multiple Temperature Rise/Cool Rates Using Example Parameters



1. Identify Target temperatures, Ramp Rates, and Dwell Time.
2. Insert Values into profile.
3. Program controller with Profile using Navigating buttons:

Press “Page” button until “ProG Li St” appears on the display.

Press “Scroll” button to advance to each screen.

Press “Up” or “Down” button to change values.

Figure 5-4. Profile Set-Up Worksheet

5-3-2. Batch Recording Using 5100 Digital Recorder

5-3-2-1. Login As Operator

1. Touch top left corner.
2. Touch pull down next to User.
3. Touch Operator.

5-3-2-2. Start Recording

1. Touch “No Batch In Progress”.
2. Touch “New”.
3. Touch field next to Job #.
4. Enter Job unique number.
5. Touch “Ok”.
6. Touch field next to Operator ID.
7. Enter Operator ID.
8. Touch “Ok”.
9. Touch field next to Comments.
10. Enter Comments or, at least, touch the blank key.
11. Touch “Ok”.
12. Scroll down to bottom of screen.
13. Touch field next to Rec. ID.
14. Touch the blank key (bottom right keyboard).
15. Touch “Ok”.
16. Touch “Start”.
17. Touch “Close”.

5-3-2-3. Stop Recording

1. Touch the block with the unit’s ID number.
2. Touch “Stop”.
3. Touch “Close” – screen returns to the home screen and displays “No Batch In Progress”.

NOTE ☞	*If a batch file was not started, the temperature data is still recorded. The Job#, Operator, Comments, and Recorder ID are not recorded.*

5-3-2-4. Saving Data To A Disk

1. Insert floppy disk into recorder.
2. Login as Operator (see Section 5-3-2-1).
3. Touch key in bottom right corner to open Root Menu.
4. Touch “Operator”.
5. Touch “Archive”.
6. Touch “Disk”.
7. Select how much data to save to floppy (typically, Last Day is sufficient).
8. Touch key in bottom right corner to open Root Menu.
9. Touch “Home”.

NOTE ☞	*DO NOT remove floppy disk before completion of data transfer.*

10. Remove floppy disk.
11. To view data, go to Section 5-3-5.

5-3-3. Running A Program To Preheat Or Stress Relief

To start the Heat Treat operation, proceed as follows:

Press the “RUN” button – The blue “Heat On” light turns on and the power source energizes.
The power source parameters are displayed on the “Parameter Display”.
The controller flashes “Hold” until the measured temperature climbs to within the Hold Back window of the target temperature.

To adjust profile during the Heat Treat operation, proceed as follows:

Press the “HOLD” button – The controller displays “HOLD”, but the heat is maintained at the present target temperature.
Press [ ] “Page” button until “ProG LiSt” appears on the display.
Press [ ] “Scroll” button to select the desired parameter for changing.
Use [▲] or [▼] “Up” or “Down” button to change value.
Press [ ] “Page” button until parameter screen appears on the display.
Press “RUN” button to resume program.

When cycle completes or to abort the process, press the “STOP” button – controller resets to segment 1 and power source contactor relays open.

5-3-4. Recovering From An Interruption

Press the “RUN” button to start profile.

Press the “HOLD” button – The controller displays “HOLD”, but the heat is maintained at the present target temperature.
Press [ ] “Page” button until “ProG LiSt” appears on the display.
Press [ ] “Scroll” button to SEG 1's tGt temperature setting.
Use [▲] or [▼] “Up” or “Down” button to adjust target temp to the present temperature.
Press [ ] “Page” button until parameter screen appears on the display.
Press “RUN” button to resume program – the controller will step to the new target temperature setting and continue through the remainder of the profile.

5-3-5. Viewing Data In Review Software

The Review software should be installed according to the instructions in the booklet provided with the CD and the readme.txt file on the CD.

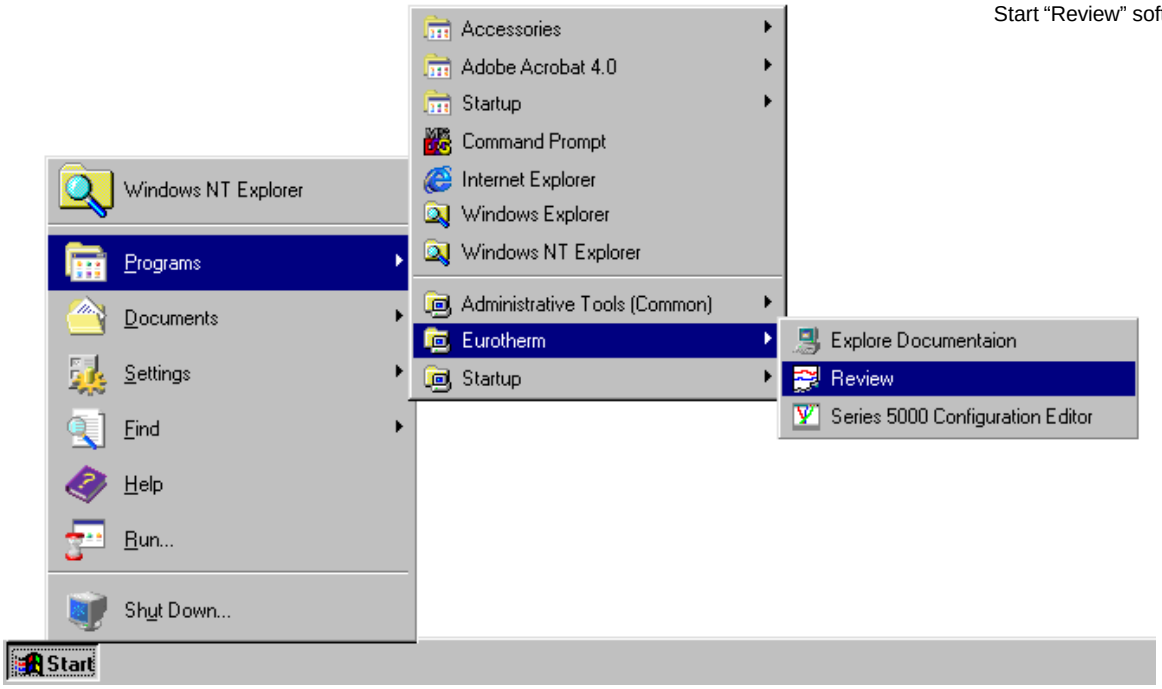
Backing Up Your Database

When the Review software is used, archive data is stored in a database on the PC. If it is important that you do not lose this data due to hardware or software failure, a backup file of REVIEW.ERV, located in the directory C:\Program Files\Eurotherm\Review, should be saved on a regular basis.

Review Software Basic Concepts

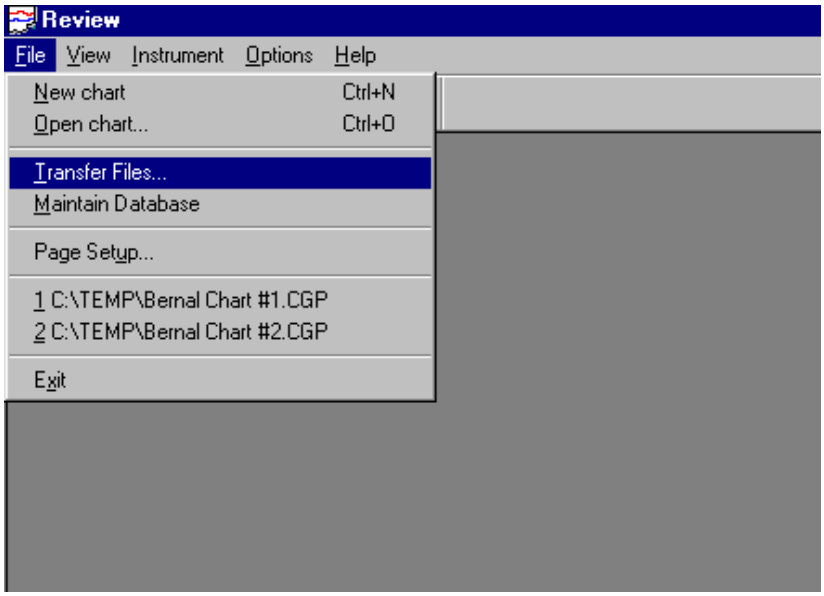
The basic concepts of operating the software are described in “Understanding Basic Concepts” available for viewing from the toolbar “Help” pulldown menu. Users are strongly advised to read this software information.

5-3-6. Running Review Software



Start “Review” software.

scrn1

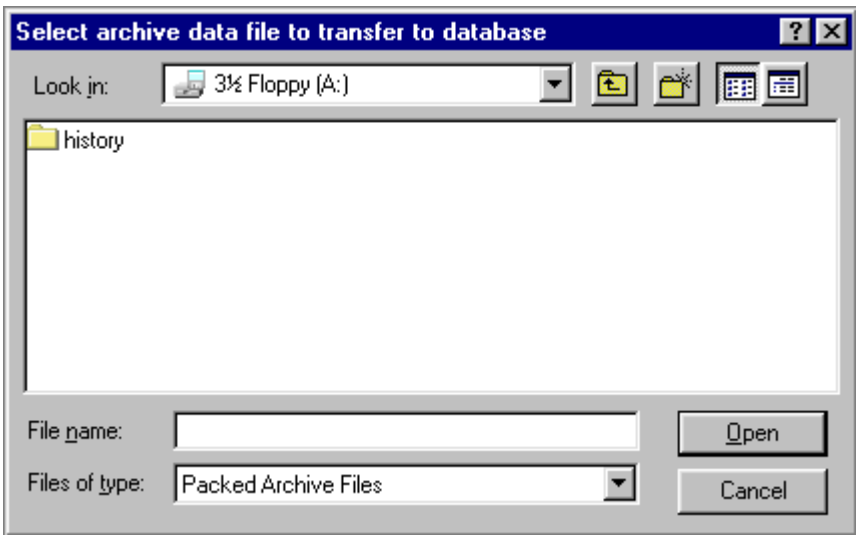


Insert floppy disk with desired file into floppy drive on pc.

Select “**File**”.

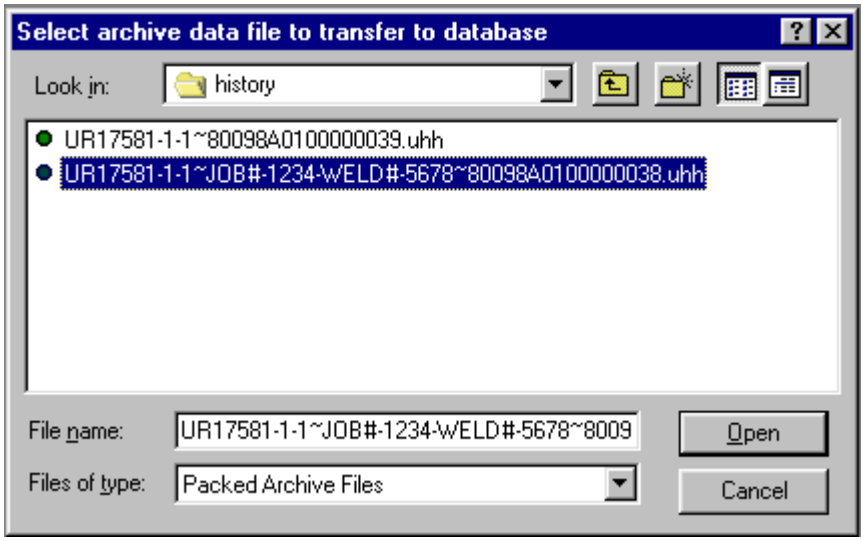
Select “**Transfer Files**”.

scrn2



Select the **"history"** folder on the floppy drive.

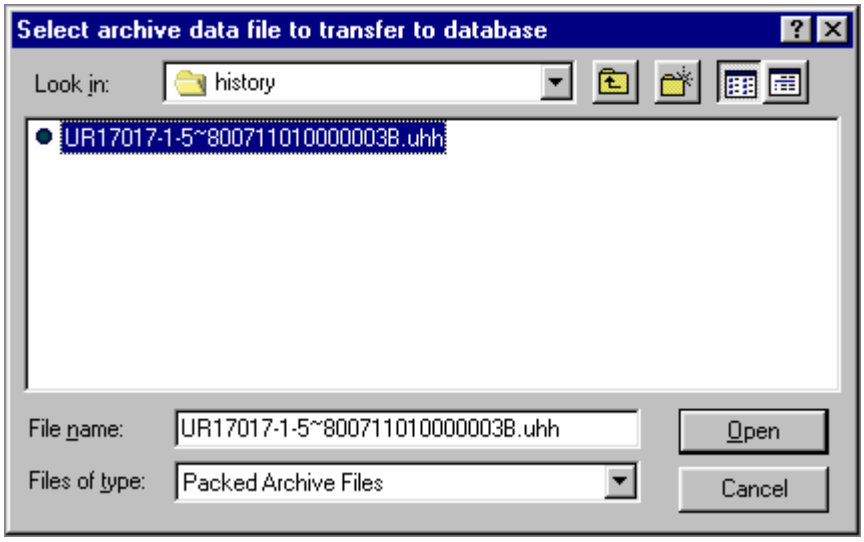
scrn3



Select the desired file.

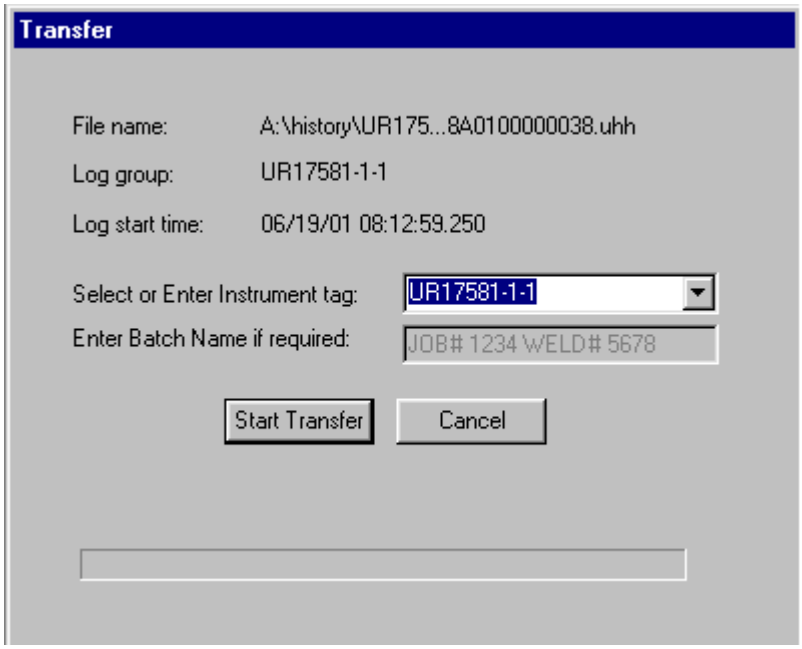
Select "**Open**".

scrn4



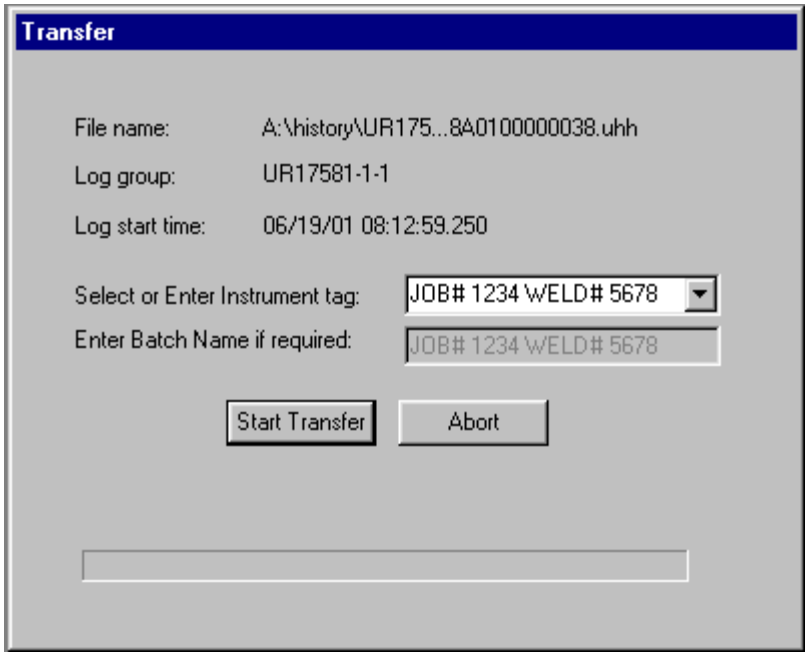
If a batch was not started, the temperature data is still recorded. The Job#, Operator, Comments, and Recorder ID are not recorded.

scrn3.1

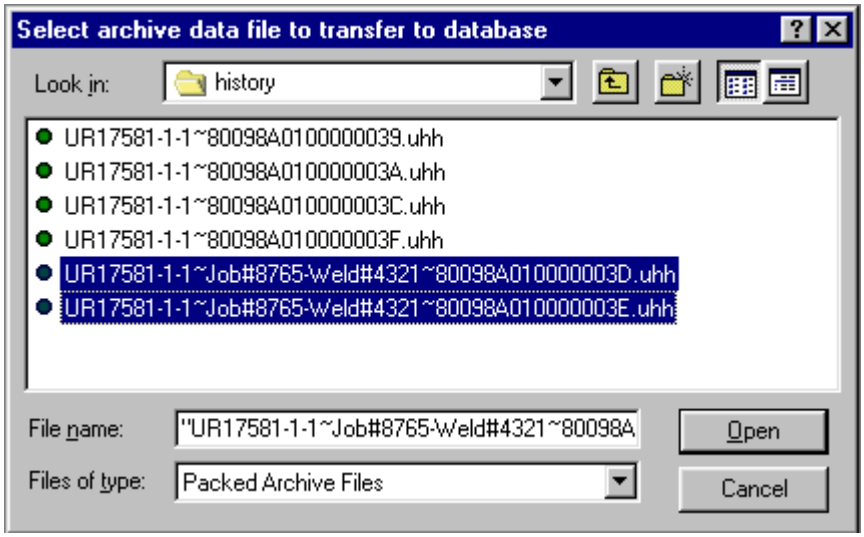


Enter the Job# or Joint# in the instrument tag field the same as if there had been a batch file. This Job# or Joint# will be the file name that is stored in memory.

Select "**Start Transfer**".



scrn5 / scrn6

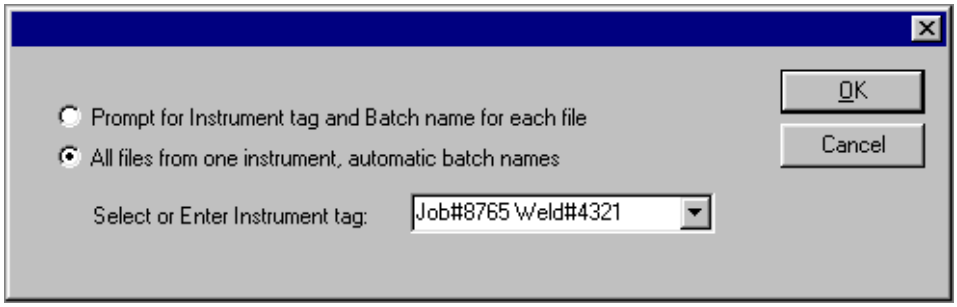


In the event of a power failure during a cycle, the recorder will start a new file.

Select both files by clicking the first file name, press and hold the "Ctrl" key and click on the second file name.

Select "**Open**".

scrn6.1


OK
Cancel
Prompt for Instrument tag and Batch name for each file
All files from one instrument, automatic batch names
Select or Enter Instrument tag:
Job#8765 Weld#4321

Select "All files from one instrument".

Enter Joint ID (file name) in Instrument tag field.

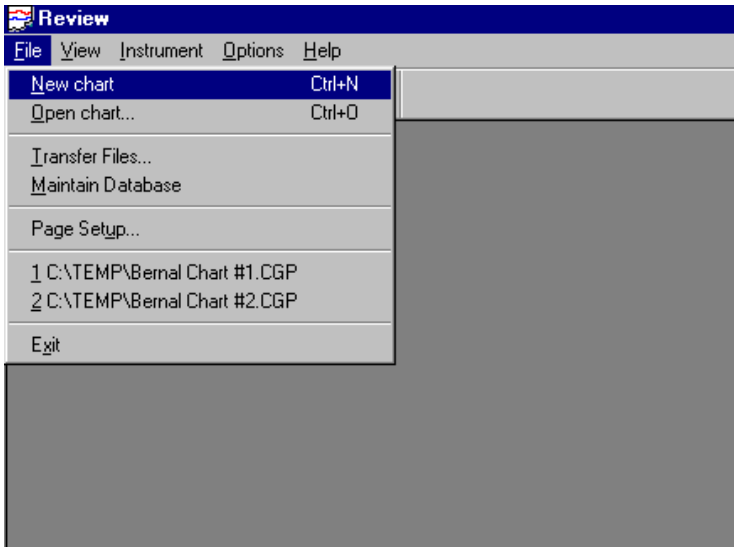
Select "**OK**".

scrn6.2

New instrument is displayed.

Select "**OK**" to add the Instrument tag.

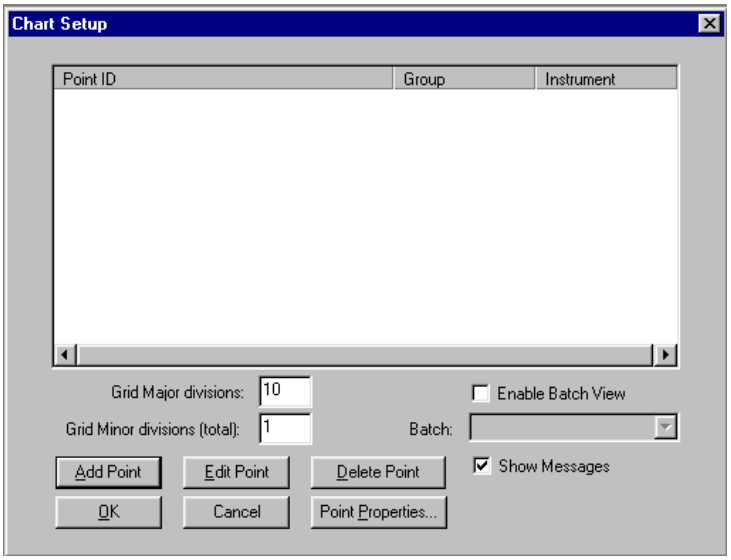
scrn7



Select "**File**".

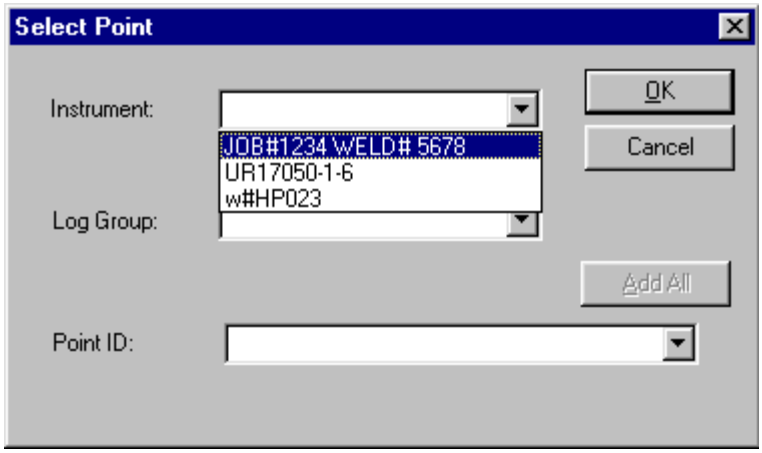
Select "**New Chart**".

scrn8



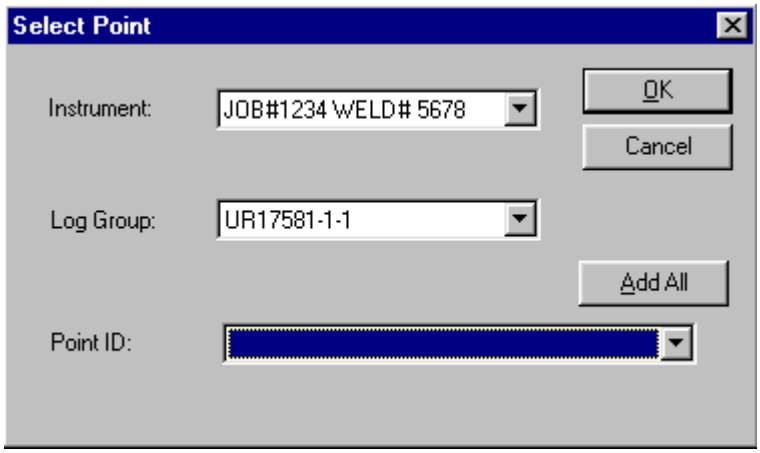
Select "**Add Point**".

scrn9



Select Instrument, this is the Instrument tag "file name" that was entered previously.

scrn10



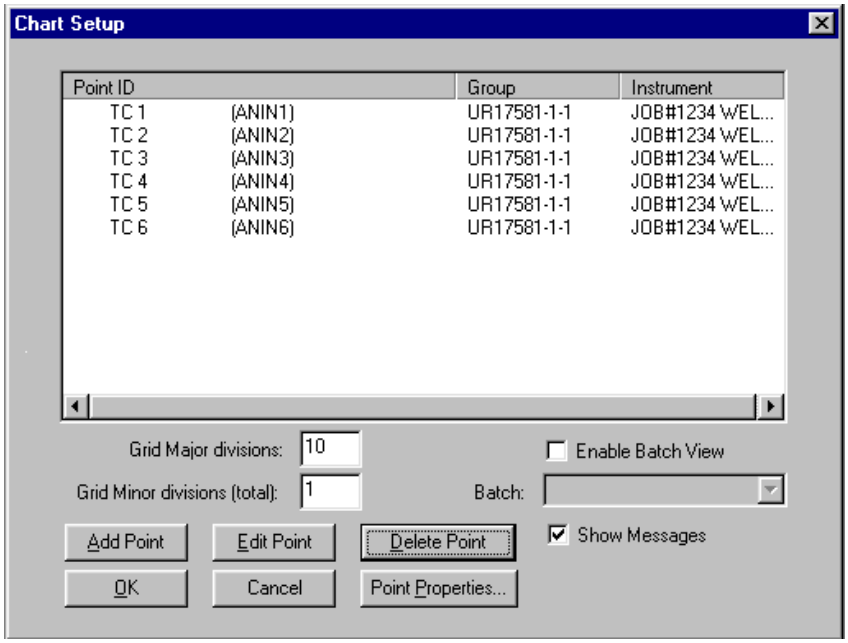
Select the appropriate Log Group.

Select Point ID to add a specific point, then select "**OK**"

or

Select "**Add All**".

scrn11

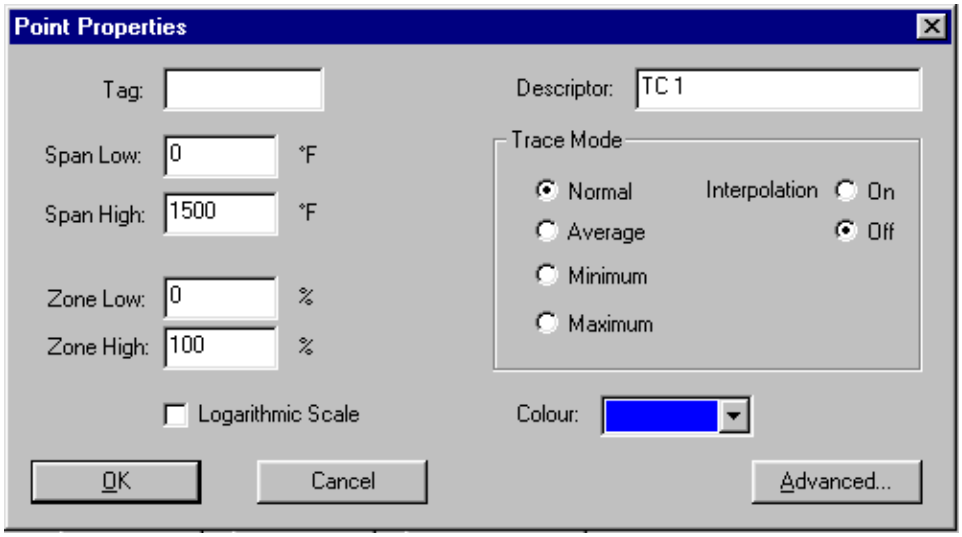


Select "**OK**" to view chart

or

Select a Point ID, then select "**Point Properties**" to edit points.

scrn12



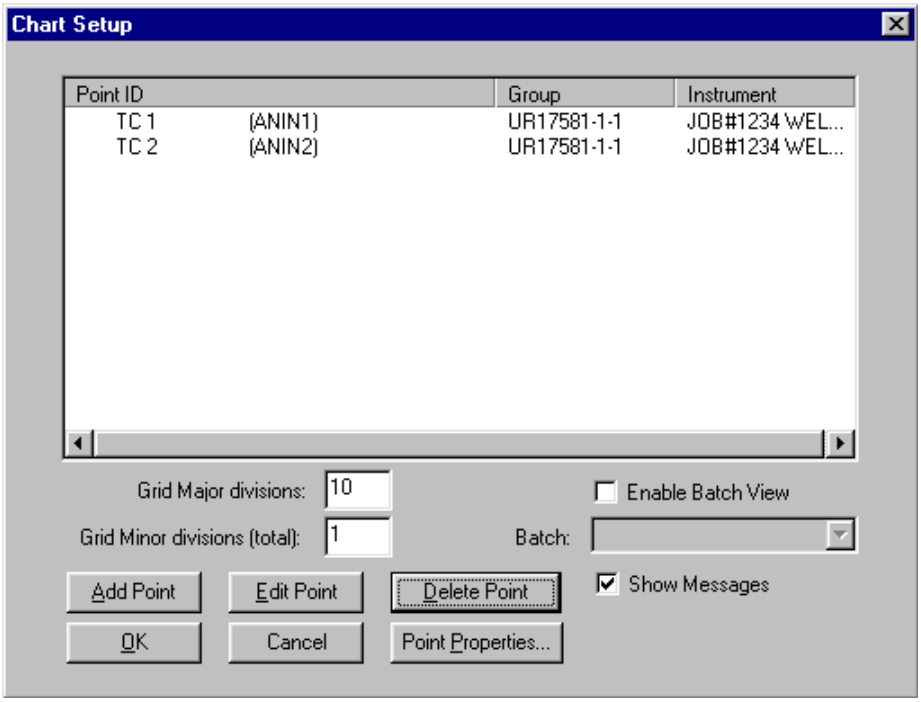
Tag – this is the label for the trace.

Span – dictates the range of temperature to plot for the trace.

Interpolation On – will show a smoothed line between points instead of steps.

Select "**OK**" when done.

scrn13

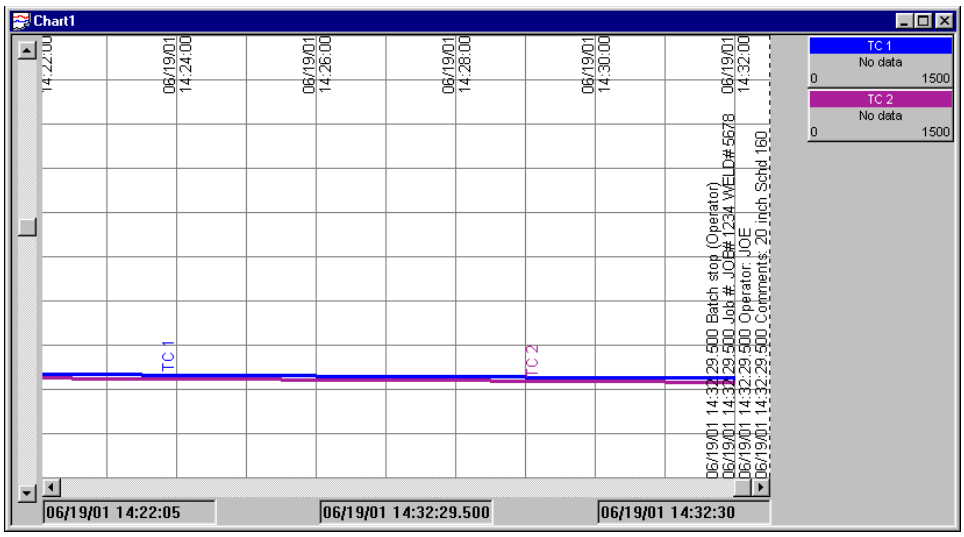


Select the next point ID to edit and repeat steps from the previous screen

Select "**OK**" to view chart.

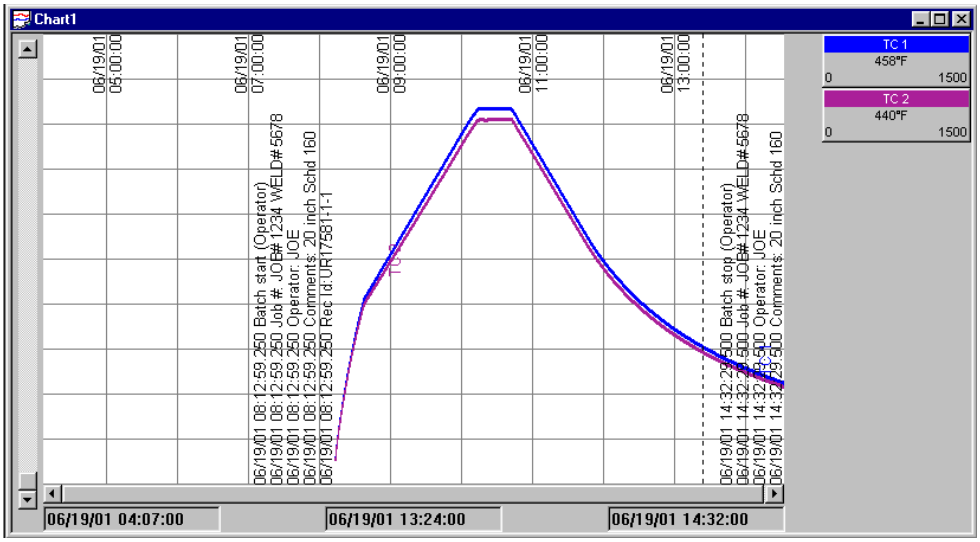
Unused point ID's can be deleted one at a time by selecting the point and clicking "Delete Point".

scrn14



This display is the default view of the profile. Note the values show "No data" which is due to the dashed line on the right side of the screen being outside of the data values.

scrn15



Click on the profile, the dashed line moves to cursor location, and the values at that point appear on the right side of the screen.

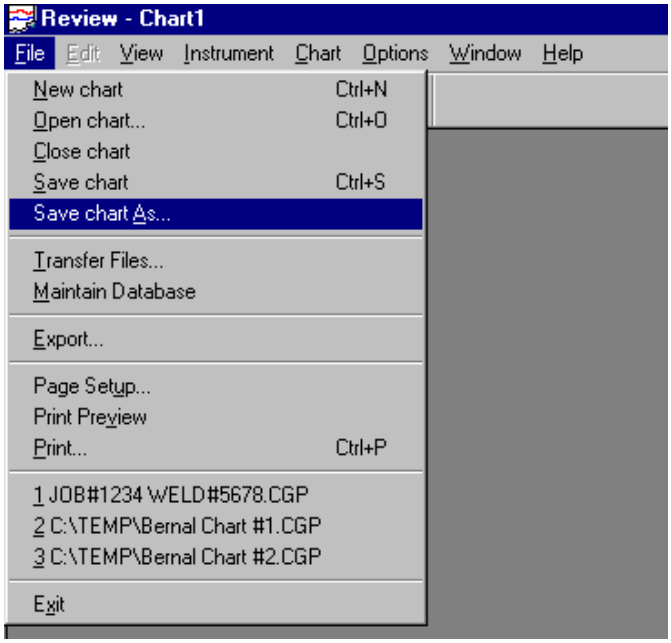
Drag the slider on the left down to zoom the view out.

scrn16

Chart properties may be edited by selecting "**Chart**", then "**Setup**".

Properties are edited as shown previously.

scrn17



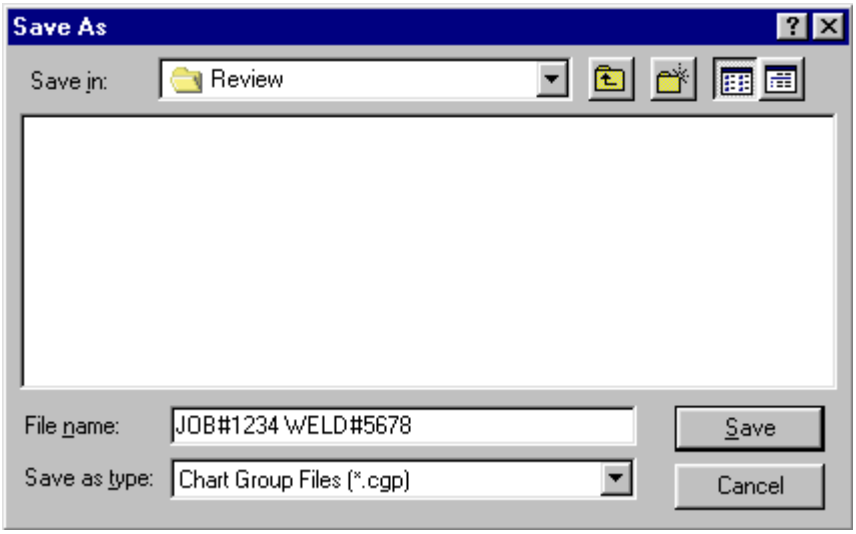
Save chart to floppy disk by selecting "File", then select "Save chart As..."

scrn18

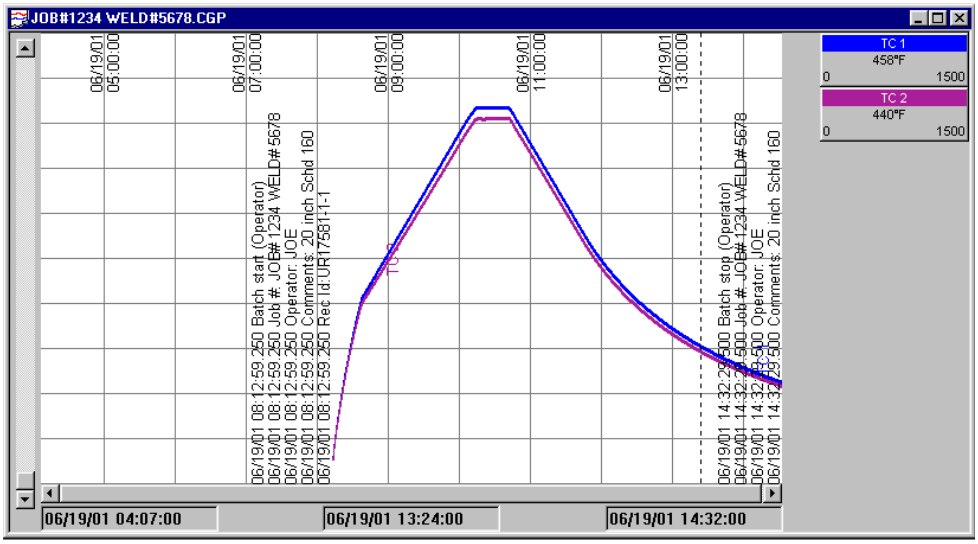
Select a path to “**Save in**”.

Enter “**File name**” to save as.

Select “**Save**”.

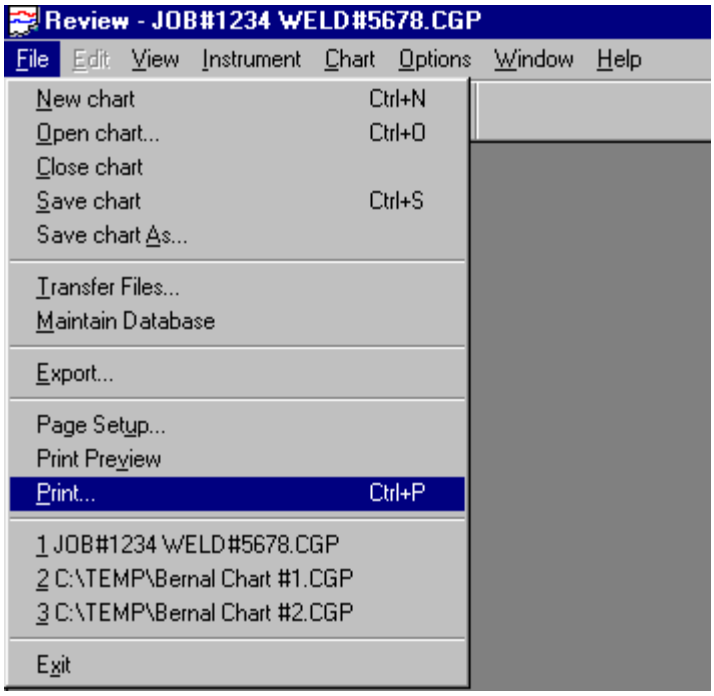


scrn19 / scrn20



The file name becomes part of the chart title.

scrn21

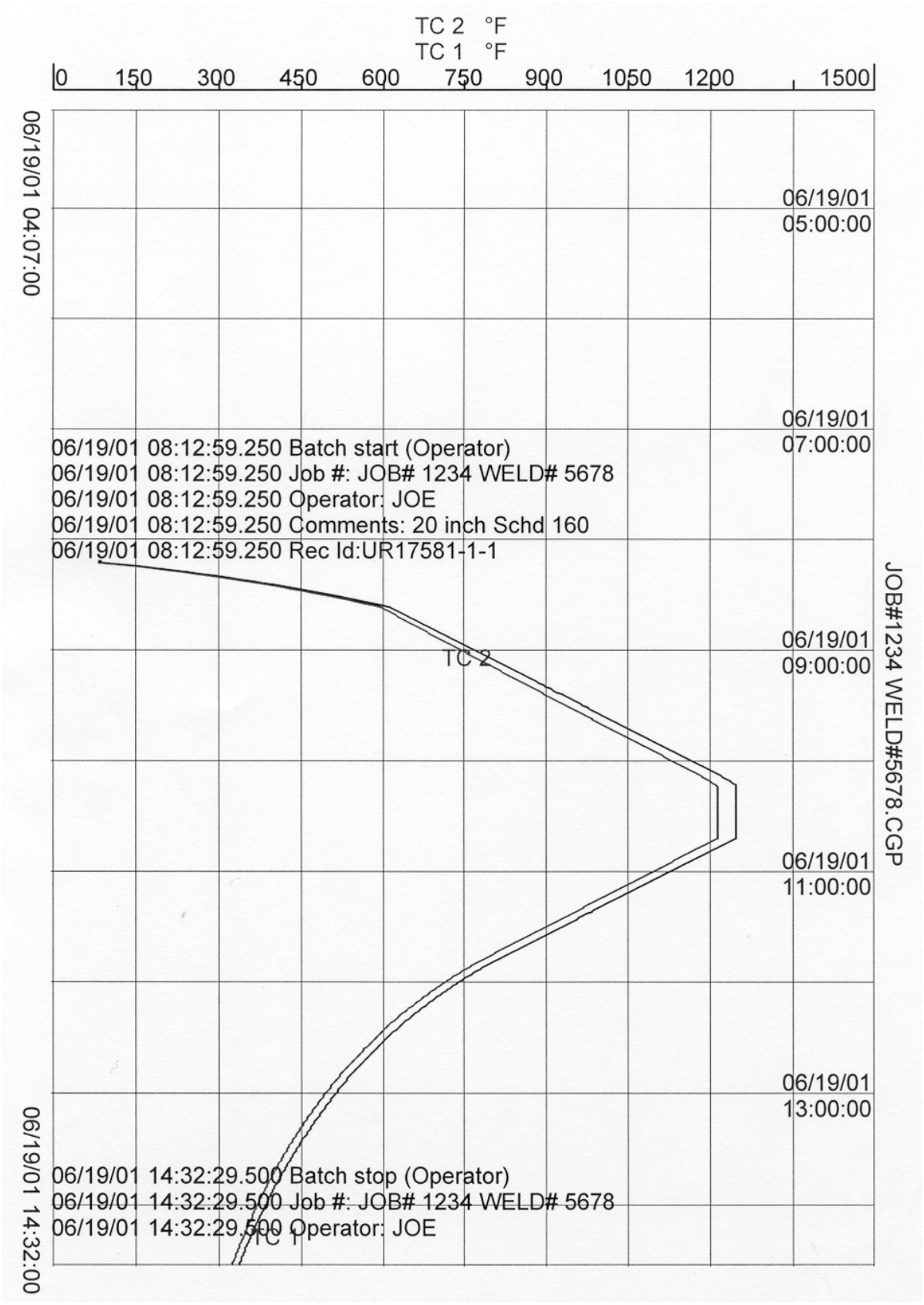


Select “**File**”.

Select “**Print**” to print entire profile on one page.

scrn22

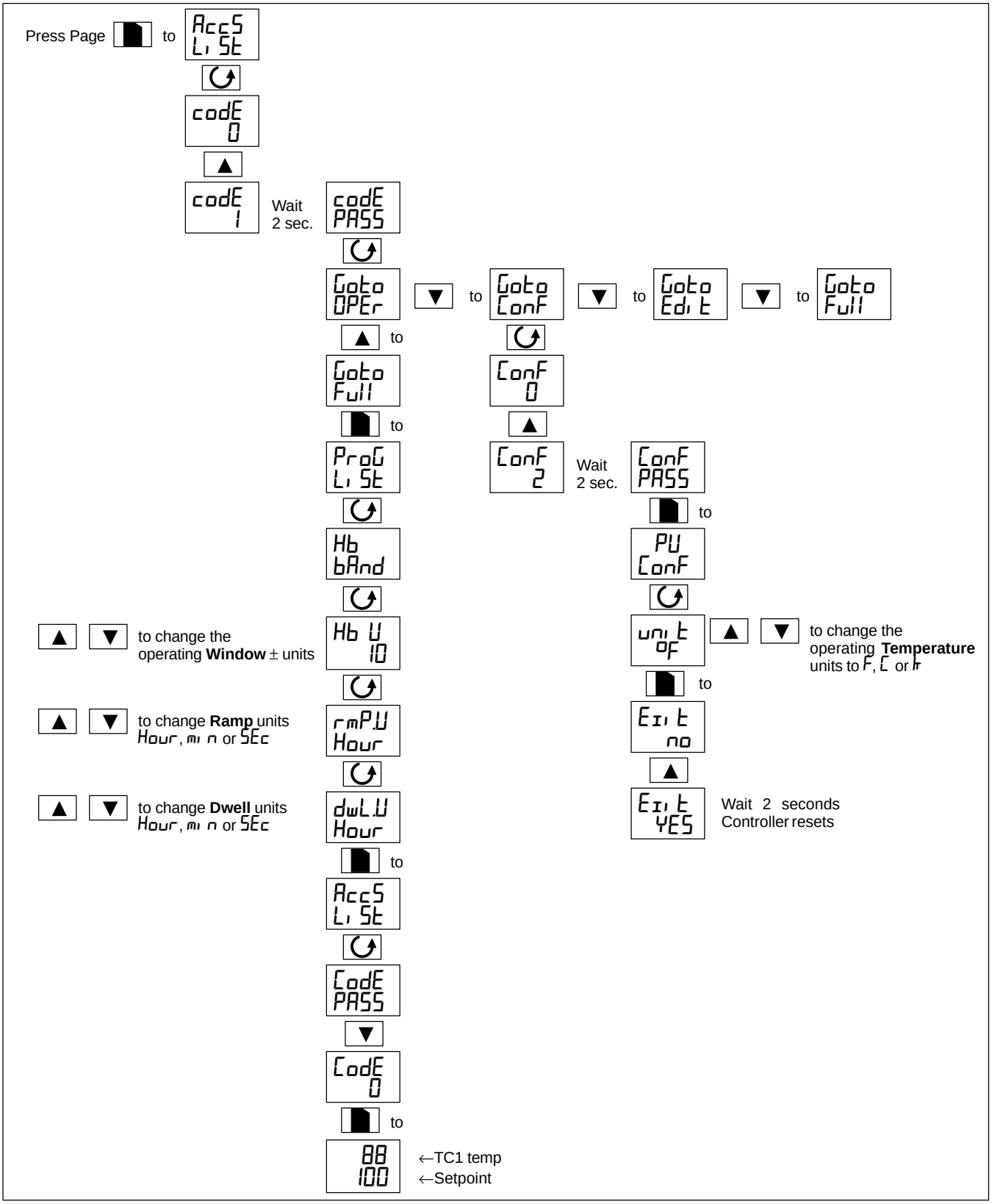
5-3-7. Typical Profile Chart Printout



SECTION 6 – CONFIGURING CONTROLLER AND RECORDER

6-1. Changing Controller Operating Window, Ramp, Dwell, Or Temperature Units

NOTE ☞ *Use the following instructions if changes are required to Operating Window, Ramp, Dwell, or Temperature units.*



6-2. Restoring Configuration From A Serialized Floppy Disk On The Recorder (For 5100 Digital Recorder)

Login as Engineer.

Touch top left corner (Logged Out) or (Operator).

Touch Blue text (pull down menu) next to User.

Touch Engineer.

Touch Password field.

Touch Numeric.

Touch 1, then 0, then Ok.

6-2-1. Load File

Insert digital recorder configuration disk into recorder.

Touch key in bottom right corner to open Root Menu.

Touch Operator.

Touch Save/R..

Touch Restore.

Touch field next to File Name.

Touch up folder.

Touch \Floppy\ (Highlights yellow).

Touch down folder.

Touch the desired 5100 Config file.

Touch Open.

6-2-2. Date Setup

1. Touch System.
2. Touch Locale.
3. Touch pull down next to Country.
4. Touch appropriate country.
5. Touch pull down next to Time Zone.
6. Touch appropriate time zone (i.e. CST Central). See “http://www.timeanddate.com” for additional information.
7. Set DST (Daylight Savings Time) if applicable. Place an “X” in the box next to “Use Summertime (DST)” to enable this option.

NOTE ☞	*In general, for those locations that observe DST:* *DST begins at 2:00 am on the first Sunday in April.* *DST ends at 2:00 am on the last Sunday in October.* *See “http://deil.lang.uiuc.edu/web.pages/holidays/DST.html for exceptions.*

8. Touch Apply.

6-2-3. Time Setup

1. Touch System.
2. Touch Clock.
3. Adjust time, if necessary.
4. Touch Apply.

6-2-4. Screen Setup

1. Touch System.
2. Touch Setup.
3. Place a check next to the dark background option.
4. Remove check next to bar charts and user screens 1 – 4.
5. Touch Apply.
6. Log in as operator.

6-2-5. Login As Operator

1. Touch top left corner (Engineer).
2. Touch pull down next to User.
3. Touch Operator.

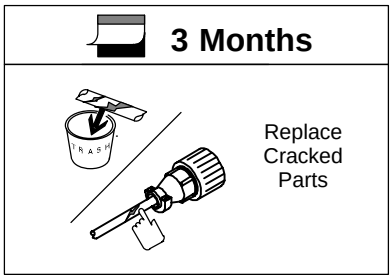
6-2-6. Go To Home Screen

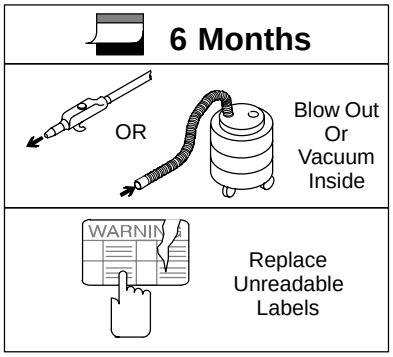
1. Touch key in bottom right corner to open Root Menu.
2. Touch Home.

SECTION 7 – MAINTENANCE & TROUBLESHOOTING

7-1. Routine Maintenance

Turn Off all power before maintaining.





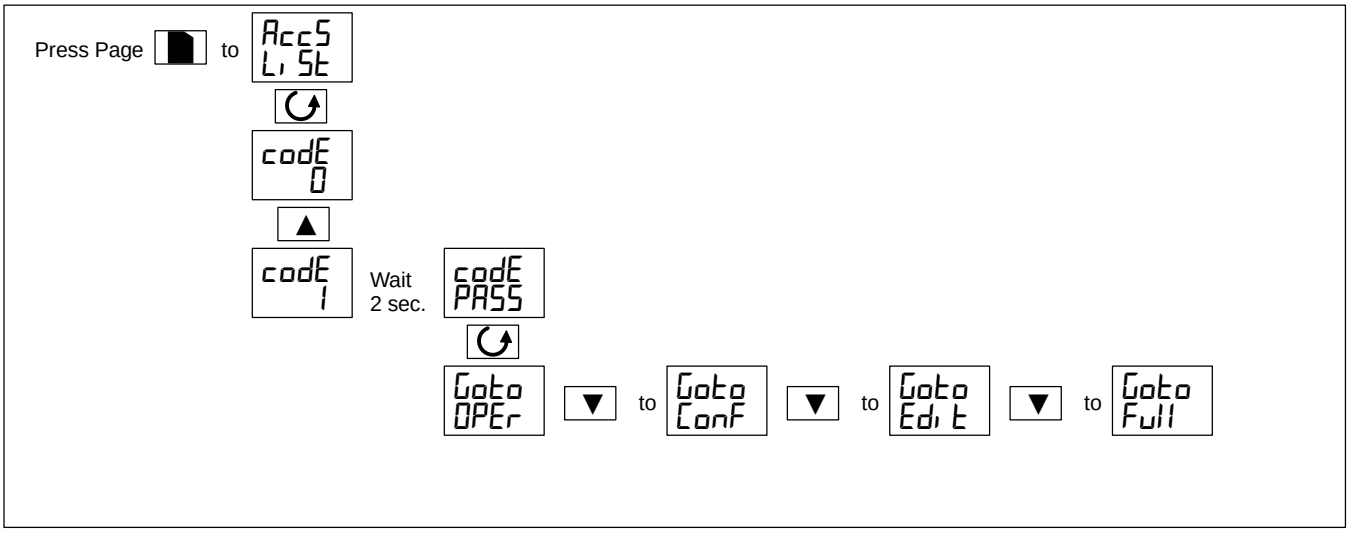
7-2. Troubleshooting

Trouble	Remedy
No heat output.	Secure interconnecting cord plug in IH/TS receptacle (see Section 3-3).
	Secure interconnecting cord plug in power source receptacle (see Section 3-3).
	Replace building line fuse or reset circuit breaker.
	See power source Owner's Manual for additional information.
Display flashes 5.br idH,	Open thermocouple. Reconnect or replace thermocouple.
Fault/Limit light is on.	Parameter Display will indicate either "Coolant Flow Error" or "PS Limit".
	"Coolant Flow Error" – ensure that cooler is plugged in and turned on. For 25 kW system, ensure receptacle switch is on. Check coolant level in cooler reservoir. Check filter on cooler and replace, if necessary. Verify that coolant "IN" and "OUT" hoses are connected to the correct fittings.
	"PS Limit" indicates the power source will run at less than full output. Verify panel/remote switch on power source is in Remote position. Turn down dial on front panel of power source until light goes out or To obtain full output, adjust the coil to get more coupling into the part.
White background, bar charts, or user screens appear on recorder display.	Reset screens following instructions in Section 6-2-4.
ConF 0 appears on the display.	Press the up arrow to change the 0 to 2. Press scroll to enter the menu. Press page to Exit no and change it to Exit YES, and the controller will reset automatically.

Trouble	Remedy
If display flashes no1 0.	Remove 2408 control from its housing by pressing locking tabs outward slightly on sides of control and pulling control forward. Look for add–on PC card in back of controller, and check that white connector is fully inserted into 2408 control. Reinstall 2408 control into housing being careful not to damage locking tabs on housing.
If display flashes no1 0 again, or if 0-10 V output card fails.	Remove 2408 control from its housing by pressing locking tabs outward slightly on sides of control and pulling control forward. Look for add–on PC card in back of controller, and remove PC card. Reinstall 2408 control into housing being careful not to damage locking tabs on housing. Disable output card function as follows: Goto ConF, 1A ConF (Module 1 Config). See Section 7-3-3. Change 1d dc.OP to 1d nonE. Scroll to Ex1t no and change it to Ex1t YES, and the controller will reset automatically. Set power source panel / remote switch to panel position and set desired maximum output. The control will operate in an on / off mode (at target temp + over temp alarm value). The over temp alarm value is set in Goto Full, AL Lo1 St, 1dH1 .

7-3. Factory Set Parameters

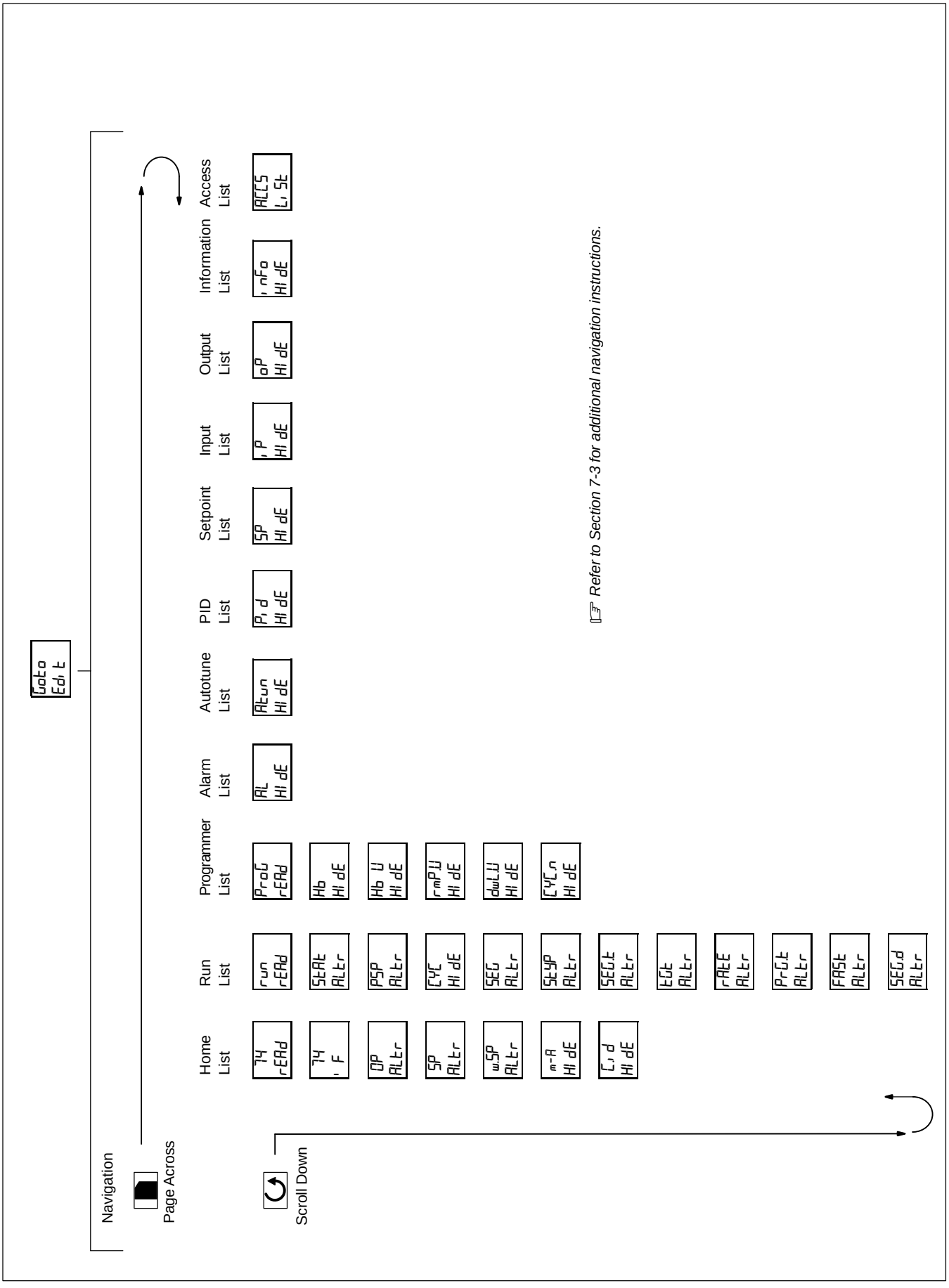
If it becomes necessary to return to factory settings, the following sections list factory settings for the 2408 controller. All settings can be accessed through the Goto screen. To access the Goto screen, proceed as follows:



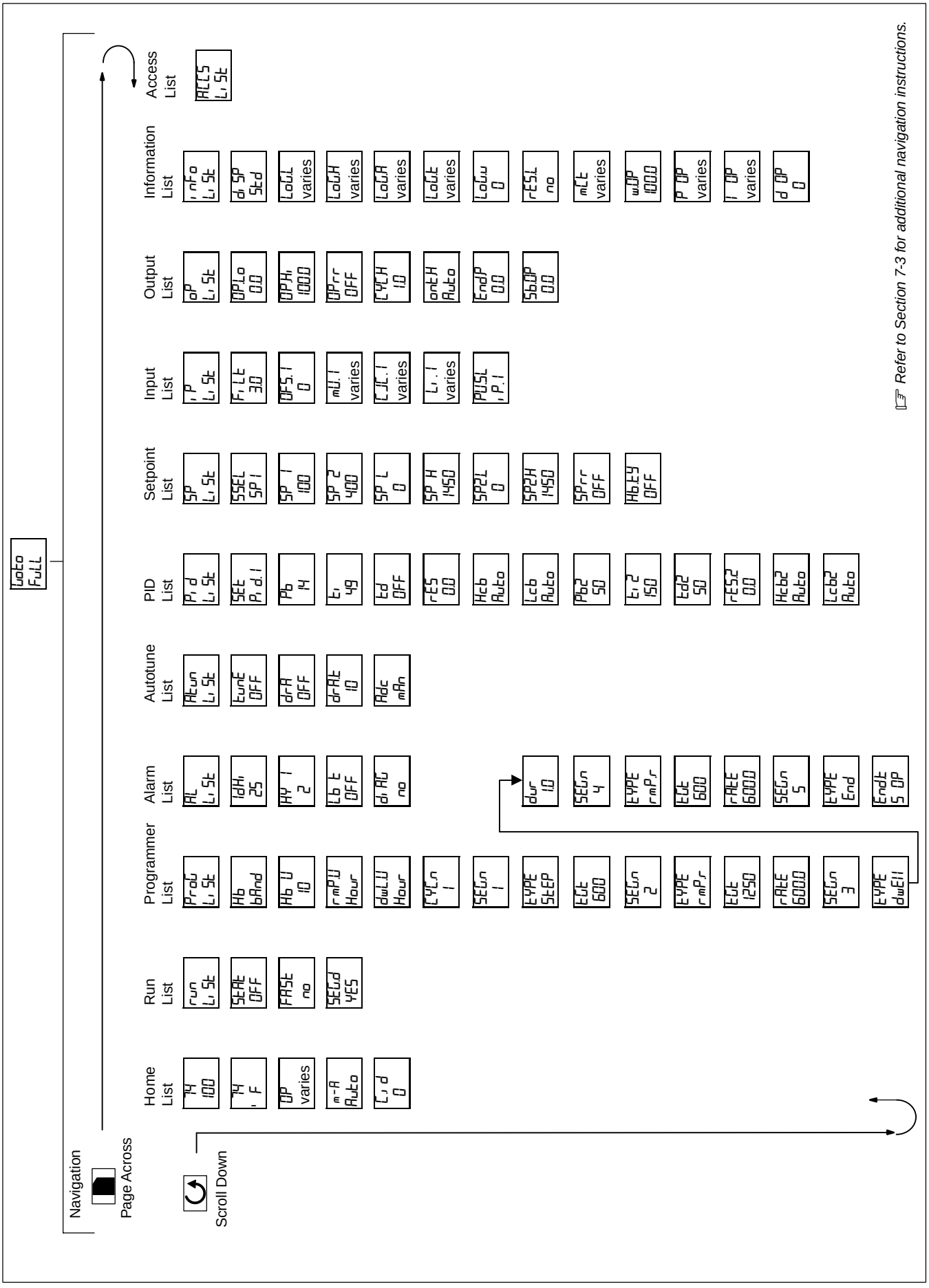
After selecting the desired Goto screen, press the scroll button to display the menu.

Press the page button to move from left to right through the columns; press the scroll button to move down the column; press the up or down arrow to change parameter settings, if necessary.

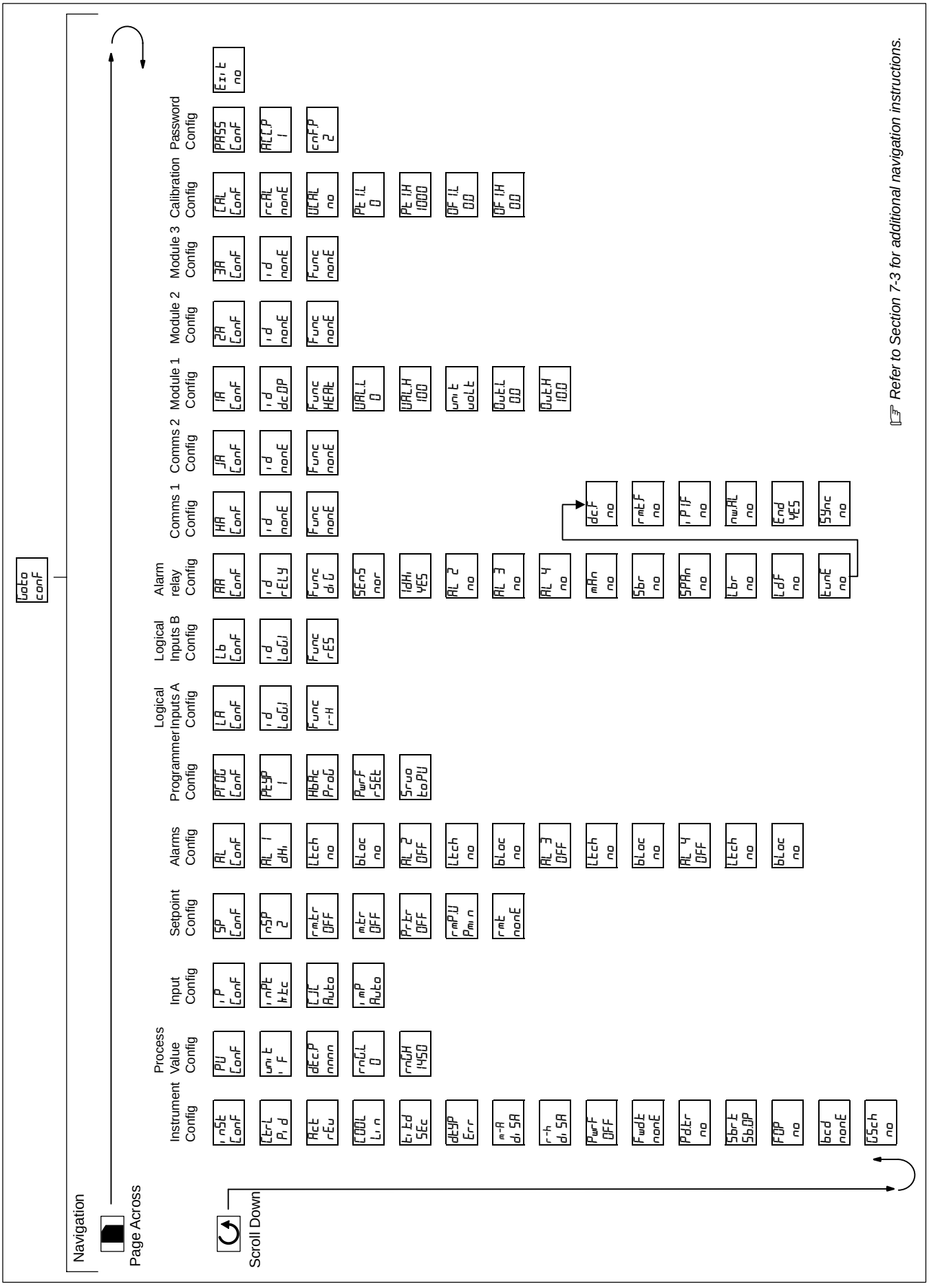
7-3-1. 2408 Controller Edit Parameters



7-3-2. 2408 Controller Full Parameters



7-3-3. 2408 Controller Configure Parameters



SECTION 8 – ELECTRICAL DIAGRAMS

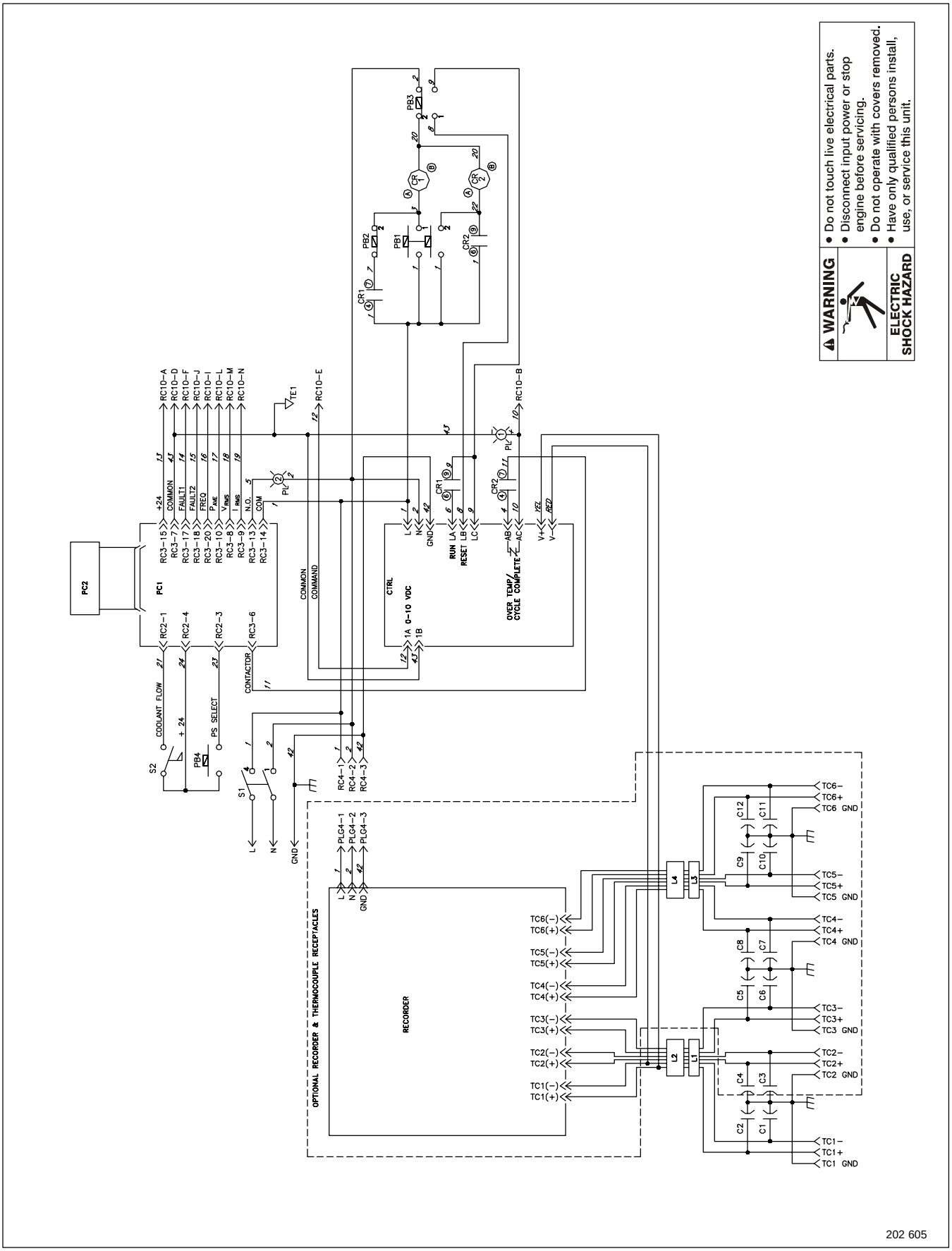

WARNING
ELECTRIC SHOCK HAZARD
• Do not touch live electrical parts.
• Disconnect input power or stop engine before servicing.
• Do not operate with covers removed.
• Have only qualified persons install, use, or service this unit.
202 605

Figure 8-1. Circuit Diagram For IH/TS

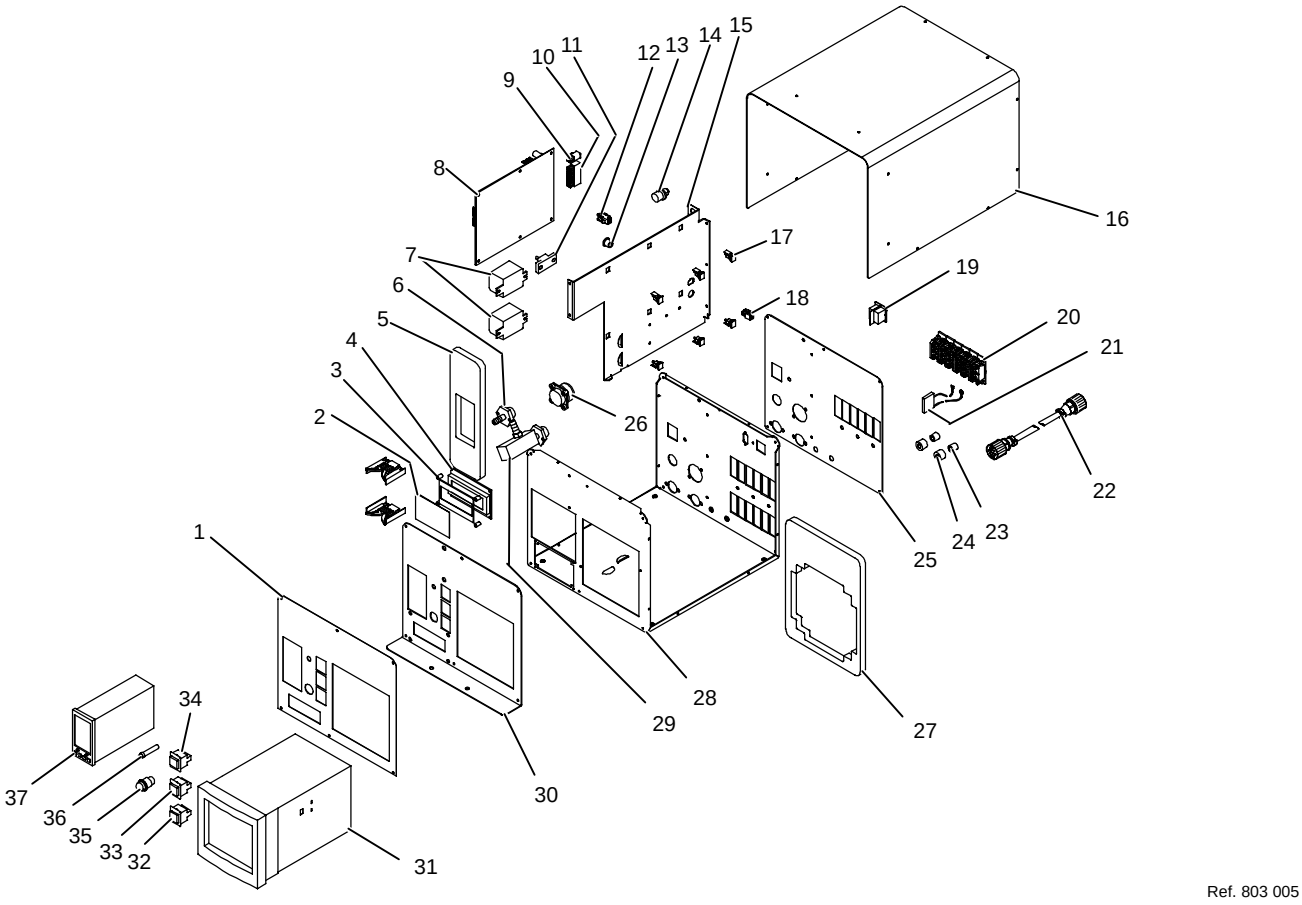


Figure 9-1. Complete Assembly

Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-1. Complete Assembly

1	203 262	NAMEPLATE, w/o recorder	1
1	204 366	NAMEPLATE, w/recorder	1
2	147 582	LENS, clear anti glare	1
3	174 446	GASKET, meter lens	1
4	156 005	TUBING, nyl	4
5	204 039	MOUNT, nprn 1/8 din controller 55 durometer	1
6	081 543	FTG, coolant	1
7	186 162	RELAY, encl 120VAC DPDT 5A/120VAC	2
8	203 181	CIRCUIT CARD ASSY, pendant control	1
9	164 899	HOUSING PLUG PINS & SKTS	1
10	169 240	HOUSING PLUG PINS & SKTS	1
11	072 253	STUD, connection single	1
12	115 090	HOUSING PLUG & PINS	1
13	088 731	BUSHING, snap-in nyl	1
14	113 333	SWITCH, pb mc no SPST 1A 115 VAC	1
15	203 089	PANEL, center	1
16	+194 029	WRAPPER	1
	147 876	LABEL, warning	1
17	134 201	STANDOFF	6
18	115 094	HOUSING PLUG & SKTS	1
19	158 506	SWITCH, rocker DPDT 10A 250VAC	1

Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-1. Complete Assembly (Continued)

20	198 893	RECEPTACLE, thermocouple	6
21	203 975	CAPACITOR ASSY	6
22	198 885	CABLE, interconnecting	1
23	204 702	CORE, toroidal	1
24	204 703	CORE, toroidal	1
25	203 264	NAMEPLATE, w/o recorder	1
25	204 367	NAMEPLATE, rear	1
26	152 492	RCPT W/PINS	1
27	204 040	MOUNT, nprn 100mm recorder 55 durometer	1
28	194 067	CASE SECTION, front/bottom/rear	1
29	202 602	SWITCH, flow w/fittings	1
30	194 068	PANEL, front	1
31	194 920	RECORDER, temperature, digital	1
32	203 137	SWITCH, pb mc DPST NC/NO 1A 115VAC red	1
33	203 136	SWITCH, pb mc nc SPST 1A 115VAC black	1
34	203 135	SWITCH, pb mc nc SPST 1A 115VAC green	1
35	027 631	HOUSING, light	1
	027 629	BULB, incand	1
	176 246	LENS, light	1
36	197 062	LED, blue	1
37	202 200	TEMPERATURE CONTROLLER	1
	192 457	CORD, power	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller
The Power of Blue.

TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables
	Options and Accessories
	Personal Safety Equipment
	Service and Repair
	Replacement Parts
	Training (Schools, Videos, Books)
	Technical Manuals (Servicing Information and Parts)
	Circuit Diagrams
	Welding Process Handbooks
Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.
For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.	

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